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Improvement in Bakers' Rotary Ovens.

Fig. 1 of the engravings is a front elevation and Fig. 2 a vertical section of an oven for baking bread, crackers, pastry, and other articles, patented through the Scientific American Patent Agency, Dec. 24, 1867. The hearth, A, Fig. 2, is of two parts; one, the base or foundation, being a cog wheel supported in the center by a suitable pivot, B, and on the circumference by small rollers or wheels, C, traversing a circular track. The other portion of the hearth is the floor of tiles, or other suitable materials, laid on the arms and rim of the wheel. The courses, which are laid, as seen in the engraving, Fig. 2, on radial lines, are jointed so that the hearth is perfectly tight. The under side of the tiles is corrugated, so that the wheel arms will offer no impediment to the free circulation of the heat.

The crown and sides of the oven are of sheet iron, having four bars of iron running crossways, to which are attached four small wheels, so that the hearth may be turned while the crown remains stationary. The hearth is rotated by means of a crank and pinion, D. The oven stands on a foundation of brick with double walls, the spaces, E, being filled with sand. Between the oven proper and the inner brick wall is a space for the heated air entirely surrounding the oven. Outside of this and between the two walls is another space, F, which is a space for cold air. Its connection with the external atmosphere is seen in the two openings in the sides of the flaring jambs of the recessed door, G, Fig. 1. In the same figure the apertures, H, with sliding doors are for removing ashes, etc., that may have lodged under the hearth. I is the damper of the chimney, seen also in Fig. 2. J is a small boiler set over the furnace, K, for generating steam, which, by the pipe, L—both figures—may be discharged into the oven as needed, for moistening the bread. The boiler has a faucet by which hot water, so frequently required in a bakery, may be obtained. The doorway, G, is closed by inner and outer sliding doors, as seen by the dotted lines. M is the handle of a pin which may be pushed in or pulled out to unite or disconnect the oven side and the hearth, so that the latter may be turned and the former remain stationary when the oven is to be filled, which is always done by commencing at the center of the hearth in front of the door. The cold air space is intended for retaining and regulating the heat of the inner hot air space. It will be seen that this outer covering of cold air prevents the radiation and escape of the heat. The oven may be revolved by power and kept moving continuously, or it may be turned occasionally by hand to equalize the heat as may be desired. Practical bakers will readily see its advantages. It can be adapted for heating by means of petroleum or other hydro-carbons.

For further information address J. A. Kinkele, 751 First avenue, New York city.

Fig. 1.

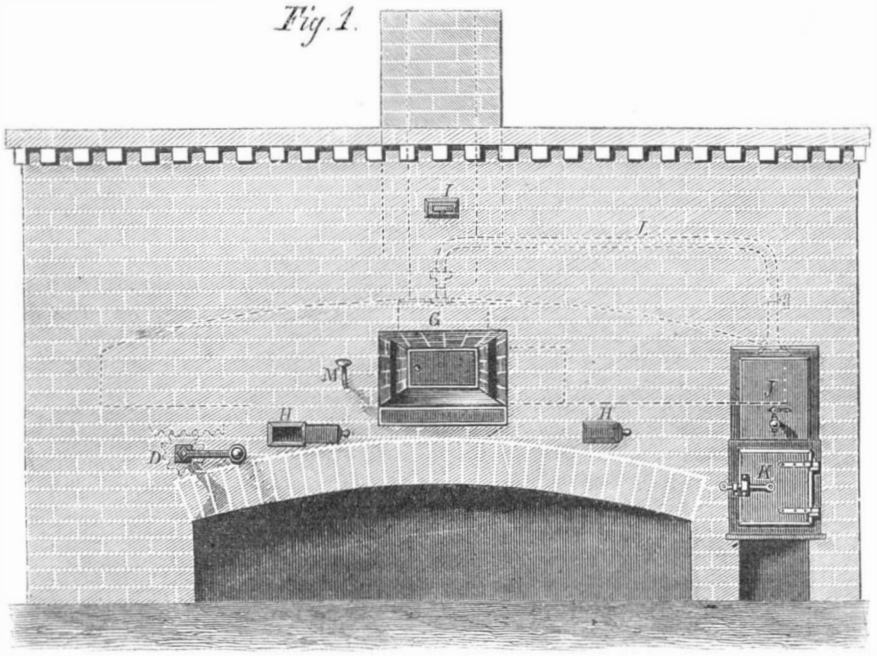
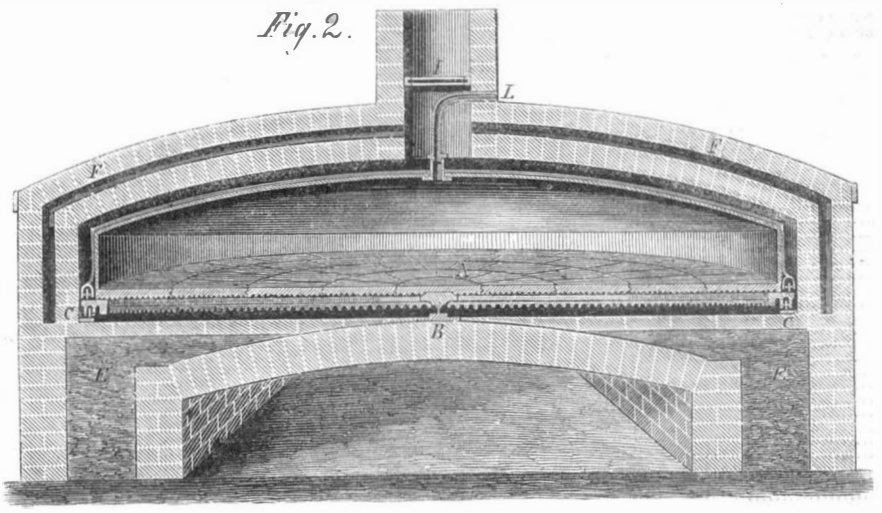


Fig. 2.



KINKELE'S PATENT REVOLVING OVEN.

Improvement in Street Car Signals.

Even the citizen of New York, or of any other large place where much of the travel depends on street cars, finds some difficulty in designating an approaching car, either by the colored lantern shown at night, or the letters and figures presented by day. The latter are either on the dasher, hid by the horses, or on the side of the car, not to be seen until the car is abreast the waiting passenger, or has passed him. The distinction of different colored lanterns is difficult to learn and not easy to understand. These annoyances to the habitué become serious troubles to the stranger. To obviate these difficulties is the object of the simple device illustrated in the engravings, and it is not only a convenience to the public, but an advantage pecuniarily to the railroad companies.

Fig. 1 is a perspective view of a car with this attachment and Fig. 2 a view of the lantern. The lantern is secured to the roof of the car by a metallic flange conforming to the shape of the roof, and placed on the left hand side of the car. The curved flange for ordinary cars is seen in Fig. 2 at A. All below that flange is inside the car. This portion comprises the light and reflector, which illuminate the interior of the car brightly, being about eight by sixteen inches, much larger than the lights ordinarily used; and the signal portion projecting above the roof of the car, fully as large. The lower portion—that below the roof flange—is hinged to allow removing and cleaning the lamp and reflector. This portion is of glass in a proper frame, and the front and rear sides of the upper portion are externally of sheet metal, painted black or some dark color, inside of which are plates of ground glass. The roof of the lantern is also of metal with passages for the escape of the gases of combustion. Through the metallic sides are cut the letters or figures, having a border painted light, as seen distinctly in Fig. 2, and serving to make them marked during daylight. In the night the light, passing through the ground glass, will throw the characters out fully as clear and bold.

This lantern and signal is cheaply made, and can be easily attached to any car, whether new or old. It is evident that the perforated or lettered plates can be removed at will and others substituted, so that a car may be transferred from one route to another, as desired. The utility as well as the elegance of this arrangement should attract the attention of our street railway managers, as the light necessary for the signal subserves also the purpose of illumination to the interior of the car.

Patented through the Scientific American Patent Agency Dec. 17, 1867, by L. V. Badger, whom address for further information at Chicago, Ill.

Fig. 1

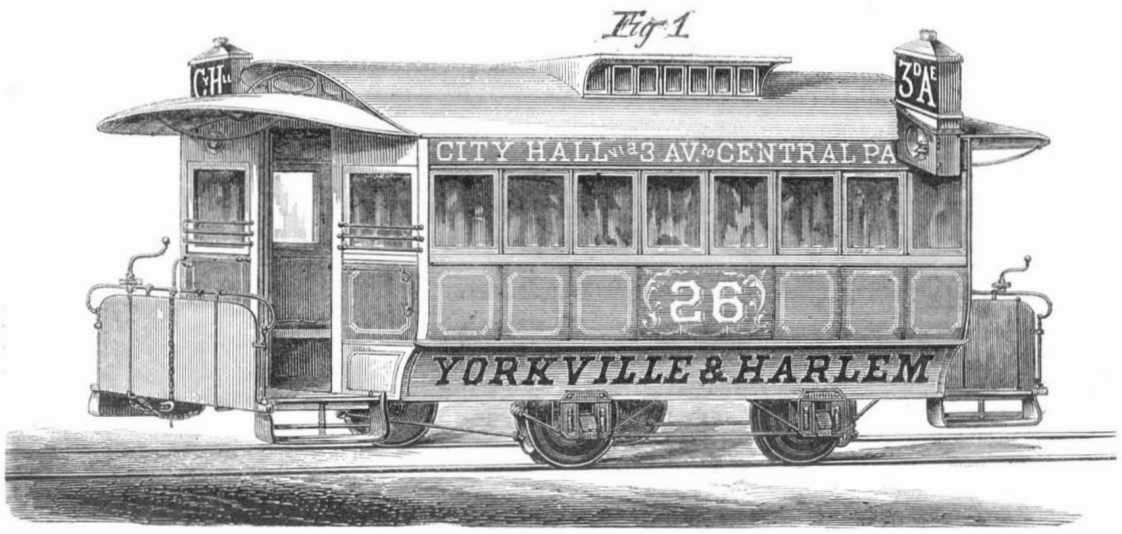


Fig. 2

BADGER'S PATENT STREET CAR LIGHTS AND SIGNALS.

TEST FOR FIXED AND VOLATILE OILS.—Several years ago M. Rousseau, of France, discovered that olive oil, the feeblest conductor of electricity, when mixed with one hundredth of its volume of oil of poppies, increased the number of vibrations of a magnetic needle in a given time, when the same was made to form parts of an electric current. Mr. Warner, an English experimenter, has enlarged the field thus opened, and shows that difference of resistance will show the purity of oils. He gives a table of resistances of volatile and fixed oils, and as turpentine and alcohol are the principal adulterants of volatile oils, and as the former has an immense resistance and that of the latter is enormously lower than any of them, the variation in the deflector compared with that given in the tables will detect, and show the extent of adulteration

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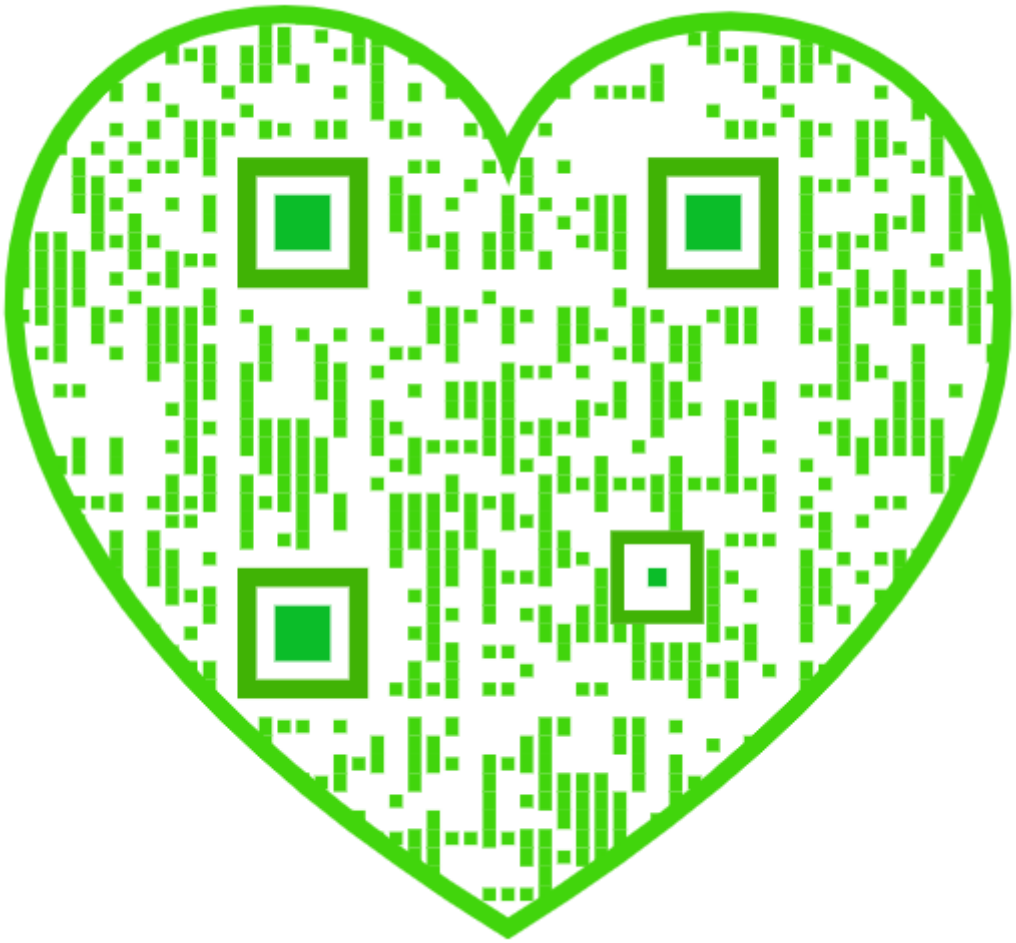

PATENT OFFICE REPORT.

UNITED STATES PATENT OFFICE,
January, 1868.

I have the honor to submit the following report of the business of this office during the year 1867.

The receipts and expenditures of the office for the year, and the condition of the patent fund at its close, are shown by the following statements:

No. 1.

Number of applications for patents during the year	21,276
Number of patents issued, including reissues and designs	13 015
Number of caveats filed during the year	3,597
Number of applications for extension of patents	106
Number of patents extended	95
Number of patents expired	1.005
Of the patents granted there were to	
Citizens of the United States	12,651
Subjects of Great Britain	191
Subjects of French Empire	80
Subjects of other foreign governments	93

No. 2.

Statement of money received during the year, namely:

On applications for patents, reissues, appeals, etc		$597,205 75
For copies and for recording assignments		49,376 17
Total		$646,581 92

No. 3.

Statement of expenditures from the patent fund:

For salaries (including the extra 20 per cent)		$156,546 50
Contingent expenses—miscellaneous	$260,812 85	
Permanent improvements in the model room, library, draftman's room, and examiner's rooms	46,301 98	307,114 83
Temporary clerks (including the extra 20 per cent)		155,339 91
Withdrawals		200 00
Refunding money paid by mistake		1,085 80
Judges in appeal cases		261 25
To this add the following items not heretofore paid from the patent fund, viz:		
For illustrations for report	$16,819 60	
For expenses of copyrights	1.895 48	18,715 08
Total		$639,263 32

No. 4.

Amount to the credit of the patent fund January 1, 1867	$264,125 88
Amount of receipts during the year	646,581 92
Total	$910,707 80
From which deduct for expenditures	639,263 32
Leaving a balance to the credit of the patent fund, Jan. 1, 1868, of	$271,444 48

TABLE *Exhibiting the Business of the Office for Thirty-one Years Ending December* 31, 1867.

Years.	Applications filed.	Caveats filed.	Patents issued.	Cash received.	Cash expended.
1837	....	....	435	$29,289 08	$33,506 98
1838	....	....	520	42,123 54	37,402 10
1839	....	....	425	37,260 00	34,543 51
1840	765	228	473	38,056 51	39,020 67
1841	847	312	495	40,413 01	52,666 87
1842	761	391	517	36,585 68	31,241 48
1843	819	315	531	35,315 81	30,166 96
1844	1,045	380	502	42,509 26	30,244 73
1845	1,246	452	502	51,076 14	39,395 65
1846	1,272	448	619	50,264 16	46,158 71
1847	1,531	553	572	68,111 19	41,878 35
1848	1,628	607	660	67,576 69	58,905 84
1849	1,955	595	1,070	80,752 78	77,716 44
1850	2,193	602	995	86,927 05	80,100 95
1851	2.258	760	869	95,738 61	86,916 93
1852	2.639	996	1,020	112,056 34	95.916 91
1853	2.678	991	958	121,527 45	132.869 83
1854	3,324	868	1,902	163,789 84	167.146 32
1855	4,435	906	2,024	216,459 35	179.540 33
1856	4,960	1,024	2,502	192,588 02	199.930 02
1857	4,771	1,010	2,910	196,132 01	214,582 09
1858	5,364	943	3,710	203,716 16	193.193 74
1859	6 225	1,097	4,538	245,942 15	210,278 41
1860					
1861					
1862		824	3.521	215,754 99	182,810 39
1863	6 014	757	4,170	195,693 29	189,414 14
1864	6,972	1,063	5,020	240,919 98	229,868 00
1865	10,664	1,937	6,616	348,791 84	274,199 34
1866	15,269	2,723	9,450	495,665 38	361,724 28
1867	21,276	3,597	13,015	646,581 92	639,263 32

Valuable reports of sections have been received from the officers in charge relating to the subjects coming under their cognizance; their accompanying exhibits show that in each department the number of applications has increased and the character of the inventions proves that the inventive faculty is still alive and usefully employed. The reports, however, generally agree in stating that, with some exceptions, the improvements are mainly in detail, perfecting and adapting what may be considered substantially as existing contrivances and processes.

Changes in the classification and in the alignment of cases having been lately made, a tabular account of the rate of increase of work in the different classes cannot be given satisfactorily.

The purpose of the change, so far as it affects subjects, has been to secure more homogeneity in the classes and to allot more systematically the floating cases whose distribution has previously been rather arbitrary than consistent. Another incentive to reorganization in this particular has been the increase in the number of examiners and assistants, which is now one fourth larger than at the date of my last annual report.

The new classification is nearly completed and will shortly be printed. The number of classes has risen from twenty-two to thirty-six, a number of subjects being now recognized individually which were formerly merged with others, under a more generic title. Among these are builders' hardware, felting, illumination, paper, and sewing machines, to each of which subjects so much attention has been directed by inventors that a division became a necessity to secure a proper apportionment of work among the corps of examiners.

The American system, as it may fairly be called, has proved itself to be well adapted to carry out the purpose of the law and the clause in the Constitution under which, in the interest of science and the useful arts, Congress has power to secure to inventors, for limited times, the exclusive right to their discoveries. The office has now a corps of experts to whom applications for patents are assigned for examination, who are intimately acquainted with the details of their respective classes, and whose judgment is worth to an inventor, in an average case, many times the cost of making the application for a patent.

It is believed that the value of the system, great as it is admitted to be, is not adequately understood, and to some, the thorough acquaintance of an examiner with his class is simply regarded as a positive obstacle in the way of obtaining a patent. Such an apprehension cannot be felt by one who truly values the system, as, for instance, by a *bona fide* inventor who has unwittingly followed in a path previously traveled by another; to him, although disappointed, the the truth had far better come in this way than after expense has been incurred in operating under a patent whose worthlessness is only made apparent when the invention proves itself valuable and provokes litigation.

The student is well aware that the English practice of granting patents was originally a system of monopoly, extending to such things as tanning, the sale of salt in a given district, the importation of certain articles, and similar exclusive powers, which proved vexatious exactions to the public.

The act of Parliament to discourage monopolies, passed some two centuries since, recites the legitimate subjects for such grants, and the wisdom of the conclusion then arrived at has not since been successfully called in question.

The advance made by the American system upon the practice which followed the legislation of the Parliament of King James, consists in giving an intelligent examination to each application, instead of granting a patent as a matter of course; and remitting the pattentee to the public and the courts when a few minutes' examination by an expert would have determined to the inventor's satisfaction, though present chagrin, perhaps, that the invention was worthless on the ground of want of novelty or its inherent radical faults.

Viewing the office as a self-sustaining bureau, under the control of the government, the accompanying exhibit is a cause for congratulation to all concerned; the inventors whose genius and industry have supported, and the legislators who have wisely recognized the rights of the inventors and the interests of the public, which are identical.

A glance at the tabular statement of the office business for a series of years shows that the constant increase in the number of applications and of patents has not been attended by a proportionate increase in the expense of the office. This is true even of this year, although over $100,000 has been expended, as shown in the financial statement, for permanent improvements and other objects out of the ordinary course. The machinery is working with less friction and loss, economy and system have been equally studied, and while details may yet be amended to complete the symmetry of the organization, the office is deservedly popular and respected as an American institution, the legitimate exponent of the useful arts whose progress it was designed to promote.

The following table shows the average cost of each examination for a series of years, the calculation being based upon the number of applications and the gross expenditure of the office in each year:

1840	$51 00	1849	$39 75	1859	$33 78
1841	62 18	1850	36 52	1860	38 04
1842	41 05	1851	38 49	1861	47 49
1843	57 55	1852	36 84	1862	36 28
1844	34 68	1853	49 71	1863	31 49
1845	31 62	1854	50 28	1864	32 97
1846	36 29	1855	40 48	1865	25 72
1847	27 35	1856	40 31	1866	23 69
1848	36 18	1857	44 35	1867	30 04
		1858	36 01		

The expenditure in 1867, for 20 per cent extra salaries (according to act of Congress), permanent improvements, illustrations for report and copyright expenses (see financial statement No. 3), divided among the applications of the year, renders the average nearly five dollars higher than it would otherwise appear. The increase in the clerical force, both expert and routine, and the multiplication of the office records, drawings and books of reference, has not been accompanied by an adequate extension of room and facilities for work. The urgent pressure in the examiners' department has been somewhat relieved by the assignment of additional rooms, but the employés in other sections are suffering from lack of space wherein to arrange and execute their work. In fact, the public passages and rooms cut off from them are now used to afford accommodation, incomplete as it is, for those employés for whom no rooms can be found.

The librarian again calls my attention to the inadequacy of the room for the proper display and the convenient handling of the books. I have nothing to add to my report of last year on this subject, except that the necessity for more room is every year more apparent, and the limitation more irksome, as the books become more closely crowded, and the space available for their consultation is diminished.

The space and facilities for the arrangement of the caveats are altogether inadequate and unsuitable. It has been my desire to isolate them in a manner consistent with their official character, but want of room has precluded the perfecting of any suitable arrangement therefor.

The great assemblage of drawings of patented and rejected applications occupies much room, but needs more. A very thorough style of improvement in the substitution of sliding and tilting drawers for the ordinary portfolios has made their handling and consultation much more convenient and expeditious. They, however, cannot be kept within the present bounds, and the constant augmentation aggravates the inconvenience.

The drawings now number over 100,000, and are becoming torn and soiled by the constant but legitimate wear to which they are exposed. Photography seems to offer the only means for renewing them. For some time past I have had it in contemplation to have photographic copies of uniform size made from the current issues and the drawings of former patents, so as to furnish to each examiner a copy of all drawings appertaining to his class, enabling him to consult them without going to the draughtman's room, where the space is insufficient for the purpose. This would much facilitate the examination of applications, which becomes a heavier tax annually as the drawings accumulate. A set of the drawings might be bound, and placed in the library for public inspection, and copies furnished to other public institutions which might be disposed to order them. Copies of the drawings might thus be furnished at a reasonable price, and afford a revenue to the office. If this plan were adopted, applications might be filed with but a single drawing, instead of two as is the present practice; and a *fac-simile* of the drawing of record, in most cases, of even size with the face of the patent, might be attached thereto.

It has been my purpose to commence by photographing each week the current issues, and several hundreds of the back issues, so as gradually to accumulate a full copy of the record, and, where a drawing may be lost, to take a photographic view of the model which might stand in its place. The copies thus made would be of even size, and smaller than the average of the originals, which would enable them to be placed in compact form, and greatly to economize the room occupied by them. The printing of the specifications was commenced Nov. 20th, 1866, and the size of the patents reduced from 15x20 to 10x15 inches. The letters patent are thus of a more convenient size for all purposes. A number of copies of each are struck off while the type is set. One copy is attached to the face of the letters patent, of which it forms the "accompanying specification;" one is bound with its fellows, in consecutive order, to form a book of records; two are sent to the Commissioner of English patents as a slight though utterly inadequate return for the magnificent series of English patents which have been, and continue to be, furnished gratis to us by them as they are issued.

Printed copies are now furnished to all who order them, at one half the former price for the manuscript, and at a profit to the office about equal to the loss on each under the former practice, which was about four cents per hundred words for each copy.

The condensation of the matter incident to printing gives compactness to the record, secures exact correspondence between the original and the record, and a safeguard against change in either.

The time will soon arrive in which it will be prudent to dispose of all models of rejected applications; the amount of room they take can be much better occupied. The model saloon in the west wing of the office is now almost entirely devoted to them, and will soon be required for the display of models of patented inventions. The office will remain in possession of the files and drawings in each rejected case, which will be sufficient for its purpose in preserving the record.

The business of the office is now reported by the examiners of classes as being up to date, so that applications are examined without delay, which is much more satisfactory to all parties than formerly, when it was weeks, and in very many cases months, in arrears. This is in the face of the fact that the business of the office is rapidly increasing, as is shown in the exhibit appended, the number of applications being over three times the number received in 1864.

Necessary Rules of Sleep.

Dr. Winslow wisely says there is no fact more clearly established in the physiology of man than this, that the brain expends its energies and itself during the hours of wakefulness, and that these are recuperated during sleep. If the recuperation does not equal the expenditure, the brain withers—this is insanity. Thus it is that, in early English history, persons who were condemned to death by being prevented from sleeping, always died raving maniacs; thus it is also that those who are starved to death become insane—the brain is not nourished, and they cannot sleep. The practical inferences are three:—1st, Those who think most, who do most brain work, require most sleep. 2d, That time "saved" from necessary sleep is infallibly destructive to mind, body, and estate. Give yourself, your children, your servants—give all that are under you, the fullest amount of sleep they will take, by compelling them to go to bed at some regular hour, and to rise in the morning the moment they awake; and within a fortnight, Nature, with almost the regularity of the rising sun, will unloose the bonds of sleep the moment enough repose has been secured for the wants of the system. This is the only safe and sufficient rule; and as to the question how much sleep any one requires, each must be a rule for himself—great Nature will never fail to write it out to the observer under the regulations just given.

Time of the Earth's Rotation effected by the Accumulation of Meteoric Matter.

In a lecture delivered before the British Association at Dundee, Professor Alexander Herschel makes the following curious observation:—A question which at present agitates the minds of physical astronomers, is to ascertain whether a slight acceleration of the moon's apparent motion can be attributed to an error in calculation, or whether the earth in the course of ages has lost in its speed of rotation. The lunar tables, which exactly represent the moon's apparent motion at the present time, do not absolutely give the hour of an eclipse which happened when the sun was setting at Babylon, some hundred years B. C. The eclipse began, according to the table, when the sun was already below the horizon, and it would be invisible at Babylon. But if the earth's rotation had been a little more rapid in former times than at present, the sun, instead of having set, would have appeared eclipsed before his setting, as was indeed the fact. To account for this change in motion, the friction of the tides has been considered, a slow accumulation of meteorites upon the earth's surface would undoubtedly diminish its speed of rotation. The change of a hundredth part of a second in the length of the day, since the earliest observations, would explain the existing discrepancy.

The Walrus.

A young male walrus has lately been placed in the Zoological Gardens, London. He is probably not more than a year old, and has only partially developed tusks; is eight feet long, and weighs about 250 pounds. He was captured by Captain R. Wells, of the whaler *Arctic*, in lat. 69° N. and long. 64° W., on the 24th of August last. Several hundred of these animals were me on the ice, and were attaked by a

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boat's crew. Among those killed was a large female; on towing the body toward the ship a young male was seen diving and swimming around its diseased parent; he was captured by a noose swung over his head and hauled on board. For several days the young captive was kept tied to a ring-bolt on the deck, and refused food altogether. Subsequently he was induced to swallow thin slips of boiled pork, and was thus fed until the vessel reached the Shetland Islands, when a supply of fresh muscles were provided for his use. The stranger excites great interest at the Gardens; the only specimen before seen there was in a moribund state on its arrival and lived but a very short time.

Science Familiarly Illustrated.

HEAT AND COLD.

BY JOHN TYNDALL, ESQ., LL. D., FRS.

Lecture II.

[These lectures, of which there are to be six, are now being delivered at the Royal Institution of Great Britain, our report, with the illustrations, being copied from the London *Chemical News*.]

I want you in the first place to pay attention to what Mr. Cottrell will do here in front of the table. There is a very thick bombshell, for which I am indebted to the great kindness of my friend Professor Abel, of Woolwich. It is now filled with water, and the hole of the bomb is plugged. Mr. Cottrell will now place the bomb in this bucket, which contains a mixture of pounded ice and salt; and I want, if I can, to explode that bomb. Do not feel in the least alarmed about it. The explosion will not be such as to injure any one. I will ask him now to cover the bomb carefully with the freezing mixture of pounded ice and salt, and we will leave it there for half or three quarters of an hour, first putting a blanket over it in order to keep the warm air of this room from acting upon it. And now on the top of this I will put these iron bottles and this leaden bottle, which also all contain water. Having placed them in the freezing mixture we will examine what occurs when the water within these bottles and this bombshell freezes. It will require, no doubt, half an hour or more to produce any action upon the bomb, because it contains a very considerable amount of water. We may possibly obtain an action more rapidly upon the iron bottles, though they are exceedingly thick. We made a similar experiment with a bombshell in the yard of the Institution, and there it occupied only half an hour to freeze the water and burst the bomb. The result is here in these fragments which are on the table. Look at the thickness of these pieces. I hope the bombshell now in the bucket will be pleasant and courteous and agreeable enough to burst before the lecture is ended but in case it does not burst, these fragments must represent the effect I intended to produce. [At a subsqeuent stage of the lecture the success of the experiment was indicated by the bursting of the bomb. At the conclusion of the lecture the bottles were also found to have been burst by the freezing of the water.]

And now let me recur for a moment to our last lecture. I then attempted something very daring indeed. I dare say many of my elder hearers will have imagined that, in fact, I aimed too high—that I endeavored perhaps to make you understand too much; but I do not think that that was the case. I think it is possible for your minds to see the operations of this thing that we call heat almost—not quite, I think, but almost—as clearly as I see these operations myself, and for this reason I wish, as far as in me lies, to make you see what I see, when I think and talk of this thing that we call heat. It was for that reason that I endeavored to cause you to picture to your minds first of all the motion of the particles produced by striking a piece of lead. You remember I put a piece of lead upon the anvil and struck it forcibly with the hammer, and in that way I produced heat. I then went on from that to what we call combustion; and I asked you to consider this combustion as something almost identical with the action of the hammer upon the lead, that the combustion of bodies is due to the fact that our atmosphere contains what is called oxygen gas—the vital gas—and that when certain bodies are raised in temperature this oxygen hits them with such force as to produce the effects that we call combustion. This, in point of fact, is the theory of combustion. If we remove the oxygen from a place where a body is burning, you will find at once that it can no longer burn. In order to make that evident to you, I have here a candle which I intend to place under what is called the "receiver" of an air pump. Now you have the candle burning within the receiver of the air pump. If I allowed it to continue burning, the oxygen inclosed in that receiver would by and by be exhausted by the burning of the candle, and the flame of the candle would die out as soon as the exhaustion of the oxygen took place. I will hasten that exhaustion by working the pump, and rendering the atmosphere around the candle rare; and you will find that presently the flame will become rather feeble. [The air pump was then set in action]. You see the flame is already beginning to become dim. Now it is very dim. As I work on it becomes still dimmer, but if I let a little oxygen into that receiver I at once restore the brightness of the flame. [Some oxygen was caused to enter the receiver]. Now the flame is brighter than it was before. If I exhaust again you will find that as we take the oxygen away we remove the atoms that are now, as it were, showering down against the combustible matter of that candle. If we take those atoms away you see the flame becomes more and more feeble; and finally if I proceed further I should be able, of course, to entirely extinguish the flame, for when these little oxygen atoms are no longer able to rain down upon that flame, then the flame inevitably goes out. I will re-admit the air before the flame is quite extinguished. [At this moment the candle ceased to burn]. Ah! I am too late, and the flame has gone out. Now, you saw that just before that flame went out it was exceedingly feeble. It was exactly similar to the flame that you obtain at very high elevations upon the earth's surface. Many years ago Dr. Frankland and myself spent a whole night upon the top of Mont Blanc. We slept upon the top, and we there burned a number of composite candles such as we have here, and we also burned a number of them at Chamounix. The air upon the top of the mountain was very rare and very thin, and it was most wonderful to see the effect of this rarefied air upon the flames of the candles. They were exactly like the flame you saw here immediately before it went out. Strange to say, however, the quantity of stearine (the stuff of which these candles were made) consumed above in one hour was exactly equal to that consumed below. There was no sensible difference, in fact, between them, notwithstanding the enormous difference in the characters of the flames. So much for these flames.

We must now say one or two words with regard to the structure of this wonderful and beautiful thing—flame. If you look at the flame of a candle you will observe a particular portion of it to be much more luminous than the rest. At that particular part the flame gives out its greatest light; and if you light two candles, such as I have here, and look at the flame of one of these candles through the flame of the other, you will find that you can, with the greatest ease, see one through the other for a considerable distance upward; but then you come to a very bright portion of the candle flame, and that bright portion almost wholly cuts off the vision of the other candle. Thus, through the part of the most intense brightness the light of the other candle cannot pass. There is something going on which intercepts the light of the other candle. Now, what is this something? This will lead us to a knowledge of the structure of this beautiful flame. The flame here is produced in this way. We have a wick in the center of this column of greasy combustible matter. We ignite the wick. The heat first of all liquefies the greasy matter, and not only liquefies it, but reduces it to a state of vapor, or gas. The candle actually makes its own gas. This vapor comes from the candle straight upward; and being heated and surrounded by the oxygen of the air, this heated vapor is immediately attacked by the oxygen; the atoms of oxygen plunge against the vapor, and what we see as light and heat is the result of this collision. But, let me say a word or two more with regard to flame. I have spoken of the vapor of the greasy matter of the candle. That vapor is composed mainly of two distinct substances. It is called a "hydrocarbon." We have there hydrogen, which is a gas, and we have carbon, which is also, under certain circumstances, a gas. These bodies are united together in the grease of this candle. Now follow me, please; and you will understand the structure of this candle flame immediately. The vapor is attacked by oxygen; but the oxygen loves the hydrogen better than the carbon. It takes the hydrogen first, and liberates little solid particles of carbon in the flame. These carbon particles are the soot which you see sometimes in a smoky flame. You see the smoke here, in point of fact. If the combustion were perfect all that smoke would be burned, and it would be raised to a white heat in the flame. In that particular portion of the flame which gives out the maximum amount of light you have a crowd of these solid carbon particles raised to a white heat by the intense temperature of the flame, And then, finally, these carbon particles also become burned, and the products of combustion pass away into the air as gas. This is the structure of all flames; first of all, an inner core of unburned gas or vapor; and then round about that the oxygen of the air plunging, as it were, against the heated vapor, and forming a kind of luminous shell round about the interior ball.

If, when the carbon particles were heated and liberated from the hydrogen in the manner I have described, oxygen were at once to seize upon them, you could not have this intense luminosity that you find in the candle flame. Here is a lamp, constructed by a particular friend of mine—Professor Bunsen, of Heidelburg—and you see it burns with a very small amount of light. The reason of that is that, by means of these apertures which he has made round about the central tube he mixes the oxygen of the air with the gas before the gas is ignited, and the presence of this oxygen entirely destroys the existence of these carbon particles, to which the light of the flame is mainly due. If I cut off the air the gas alone will come out, and you see then at once that the light greatly increases. In the former case you have the carbon particles halting for a moment in the flame, and raised to a white heat before the oxygen seizes them; and thus you have a far greater amount of light than when you allow the oxygen to get in among them and seize them the moment they are liberated.

The combustion which I have just shown you is of a very vivid kind. There are also slow kinds of combustion going on. For instance, when the oxygen of the air attacks iron, it produces that red iron rust with which you are all very well acquainted. This is just as much a case of combustion as the combustion exhibited in the candle flame. It is a case of slow combustion. When the earlier of the Atlantic cables was made it was surrounded by iron sheathing to protect it; and it was found in one case that the temperature of a great coil of this cable became very high indeed, so high as to imperil the gutta percha and other substances that were employed to insulate the wire. This was found to be due entirely to the slow combustion—to the rusting, or "oxidation." as it is called, because oxygen is concerned in it—of the iron. The iron was slowly burned, and the heat could not get away because the coil was so large, and the consequence was that its temperature became dangerously high. Mr. Siemens has invented an exceedingly beautiful instrument for the purpose of testing cables for this heat. And so in the case of our own bodies there is going on as true a combustion as in the case of the burning candle. We take in food, it is conveyed into the blood, we breathe the oxygen of the air, that oxygen comes into contact with the food in the blood, and the food is there slowly burned, and consequently we are rendered warm. The heat of our bodies is derived entirely from this slow combustion.

Toward the close of the last lecture I passed on to a consideration of what heat does. The usual result, as I told you, is that bodies are made to expand with heat. I made several experiments in proof of this, one with a very beautiful piece of apparatus made for me by Mr. Becker, by which we multiplied the action more than a thousand fold in order to enable you to see the expansion which occurred when I breathed against a pillar of lead. I now want to make clear to you the wonderful strength of this force with which bodies expand, and the wonderful strength of the force with which they contract. The forces which pull the atoms or molecules of a body together on its cooling are perfectly enormous. I will illustrate this by an experiment which you will understand by reference to this model. I place in a hole at the end of this iron bar a little piece of wood; you see the two ends of this piece of wood rest against these two edges; and if I pull the bar I break the piece of wood. You will observe that it first of all bends and then breaks. Now what I am going to do is this: for this piece of wood I am going to substitute a piece of steel, and then I shall put a red-hot bar of iron across, and screw it on between these two points. It will cool, and the contraction will, I think, be so great as to break the bar of steel in the way in which I have broken this bar of wood. You see the construction of this iron apparatus is much the same as that of the model. [A red-hot bar of iron was screwed to the apparatus as described by the lecturer]. I will hasten the cooling by pouring a little water on the iron bar. [In the course of a few seconds the steel bar snapped]. There it is. The bar of steel is, in point of fact, smashed by the force with which the particles of the iron bar pull each other together when the motion of heat is taken away from them by cooling. That force is, as I have said, perfectly enormous.

Before we pass on to consider the expansion by heat of other bodies beside solid bodies, I should like to explain for the sake of the elder boys (not for the sake of the younger ones, because they will, perhaps, find it a little too difficult for them) the use of one term that is in common use in books that are written on the subject of heat. Suppose you have a piece of lead 3,510 inches in length, and suppose you augment the temperature of that lead one degree, you would find that its length would extend from 3,510 inches to 3,511 inches. That is it would extend $\frac{1}{3511}$ths of its length. This is the fraction of its own length which the lead expands on having its temperature augmented one degree. Now, that fraction is what is called the co-efficient of expansion of the lead. This co-efficient of expansion is much less in many bodies than it is in the case of lead. For iron this co-efficient of expansion is not half what it is for lead. This difference renders it needful for engineers to be very careful not to unite different metals which have different co-efficients of expansion in such a way that on their expansion they would produce distortion and disruption, and, perhaps, fracture. Here, for instance, is a ruler which has one side of brass and one of iron; and when it is heated, in consequence of the brass expanding more than the iron the ruler becomes curved or buckled up. Now, in an architectural structure different metals might be associated in such a way that on a change of temperature the edifice would be endangered in consequence of the metals expanding or contracting in different proportions. That fact is a very important one for architects to remember.

We will now proceed to a consideration of the expansion of liquids by heat. Here is a bottle containing water, another containing alcohol, and a third containing the liquid metal mercury. Here also is a bulb containing mercury. If I lay hold of this bulb the mercury within it expands, and this little column above the bulb is forced upwards. Now I want to show you, if I can, the motion of the mercury when the bulb is heated, and for that purpose I will throw an image of the column upon the screen. Now you have on the screen an inverted image i' of the mercury column $i\,i$, turned upside down by the lens L which you see in front of the lamp E, and I think you will see that when I heat the bulb, the column $i\,i$ will go towards the lower part of the screen, owing to the expansion of the metal. It really goes upward, but it appears to go downward, owing to the image being inverted. I will now place the bulb in hot water, observe the motion which I indicated. I will now take a bulb containing the liquid alcohol, which is much more expansible than mercury. Mr. Cottrell has colored it blue, that you may see it better than you would if it were not colored. The color indicates the column of liquid. At the first moment of the bulb being heated the column of liquid will appear as if it contracted instead of expanded. This apparent contraction is due to the fact that when we first plunge the glass vessel containing the alcohol into warm water that vessel itself expands, and becomes, in fact, of larger capacity, and thus the column of liquid sinks in it. This sinking, however, will immediately disappear, and then the blue liquid will go up in the tube far more rapidly than the mercury rose. I might take other liquids and show you the same effects, but we must now pass on to the question of the expansion of gases.

You will understand in a moment that gases are capable of expansion by heat. For instance, I have here (Fig. 2) an empty bottle F, to which is attached a tube; and Mr. Cottrell

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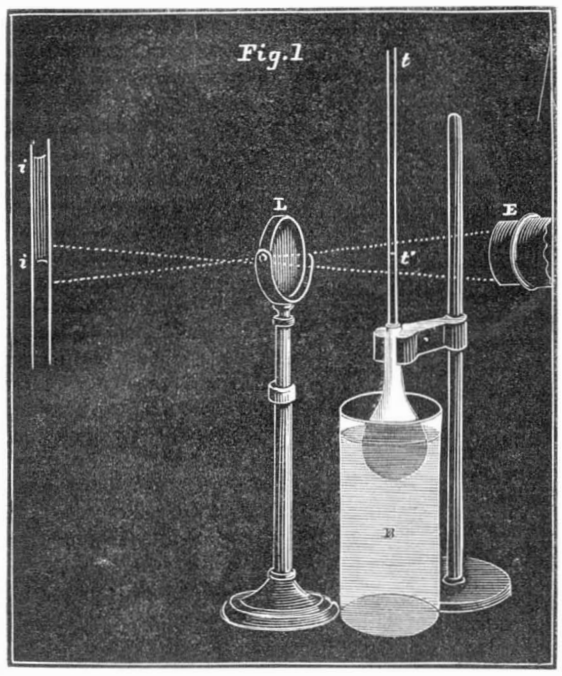
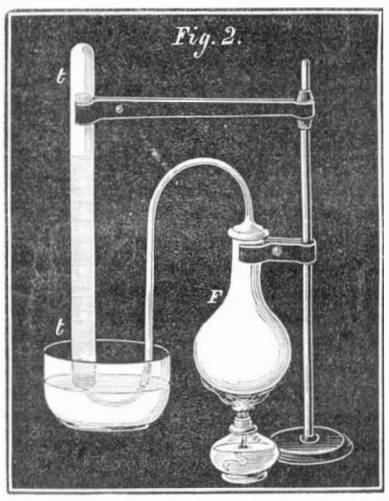
is now placing the end of that tube underneath this column of liquid *t t*. The column of liquid is supported by what the elder boys know as the pressure of the atmosphere upon the liquid outside. Now, if I heat this bottle I cause the air in it to expand; it will ascend with force iuto the tube *t t*, the water will descend, and in that way I think I shall be able to



transfer the air from the bottle into the tube now containing the column of water. Observe now the bubbles of air going up, and pressing down the liquid column. This pressure is due to the expansion by heat of the air in the flask. I might continue this process until nearly the whole of the air of the flask was transferred to the other vessel.

In reference to this subject I might refer to this instrument, which is a thermometer made for the purpose of measuring heat by means of the expansion of air. Here at the top is a bulb filled with air. The liquid column now stands at a certain point. If I put my hand upon it the column descends.



The warmth of my hand is causing the air to expand, and in doing that it drives down the liquid column.

Before proceeding further, I must say one or two words with regard to a term I have just employed. I have used the term "thermometer." That is, *a heat measurer*. I have made use of this bulb of mercury, and the tube attached to it, purely for the purpose of enabling you to understand the common thermometer. If you take this bulb of mercury and plunge it into melting ice, or into water just frozen, at any part of the earth's surface, you will always find that the column of mercury stands at precisely the same hight, so that this temperature of frozen water or melting ice is the same thing all the world over. Here, then, we have, so to say, a standard of temperature. First, suppose that our bulb of mercury is plunged into melting ice: that will give the freezing point of water. Then plunge it into boiling water under the same barometric pressure, and the hight to which the column will rise under such conditions will be the same all the world over; and that point will indicate the boiling point of water.

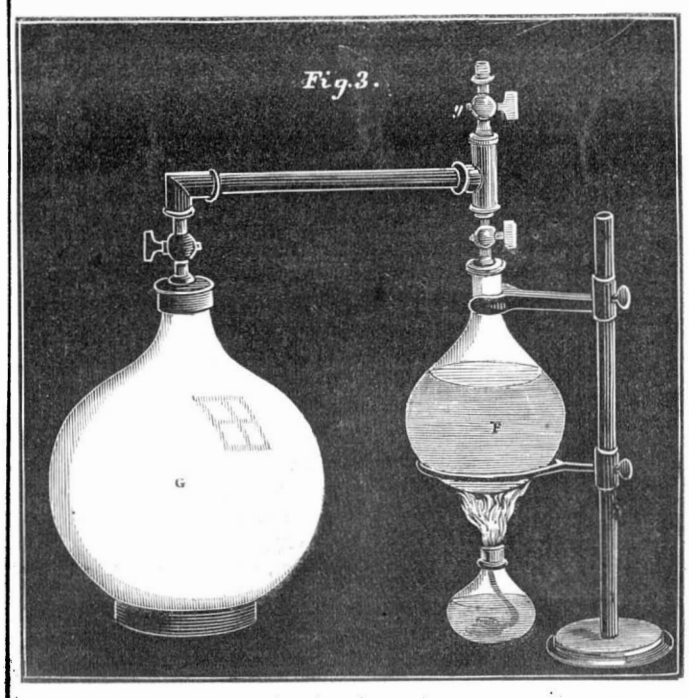
We have three different kinds of thermometers. First of all there is the thermometer of Fahrenheit. In constructing his thermometer Fahrenheit made use of a mixture of ice and salt, and he found that this mixture gave him a far greater cold than that of ice itself. He thought this was the greatest cold possible, and he therefore marked that temperature as the zero of his scale, and began to number his degrees from this zero which represented the temperature of pounded ice and salt. He then went upwards to the freezing point of water, which was 32 degrees above his zero. He then obtained the boiling point of water, and divided the distance between the freezing point and the boiling point of water into 180 equal parts or degrees. The 180 added to the 32 makes Fahrenheit's boiling point 212 degrees above his zero. The second thermometer is one which is in general use among scientific men, and I wish it was employed in all parts of the community. It is known as the Centigrade thermometer. This was invented by Celsius, and is sometimes called Celsius' thermometer. Here we have the distance between the freezing point of water and the boiling point divided into 100 equal parts or degrees. We have a third sort of thermometer which is known as Réaumur's. It is a very awkward one, but it is nevertheless used a great deal in Russia. In this instrument the distance between the boiling and freezing points is divided into only 80 different parts. The degrees in these three different thermometers—Réaumer's, the Centigrade, and Fahrenheit's—are in the respective proportions of 4, 5, and 9. So much then for the terms "degree" and "thermometer" which have been used in these lectures.

Now, if possible, I should like to show you heated air. You cannot detect it by looking at it directly in the atmosphere, but it can be made evident by a device which I intend now to employ. I can show you this heated air rising up in streams from a heated body. Here is a hot spatula. If you look directly at this hot body you can see no emanation whatever from it; but now my assistant will throw a beam of electric light upon this spatula, and we will observe the shadow of it upon the white screen. You now see above the image of the spatula a stream of heated air rising from the hot surface. This effect is quite invisible when you look at the spatula in the ordinary way.

I want now to show you another stream of air. I have here the means of giving you a still greater stream of heated air; and I want to make you acquainted with the celebrated invention of that eminent man, Mongolfier. He conceived the idea of catching these streams of heated air in a bag, and in this way the bag was carried up. From the chimney of this stove we get a stream of heated air. You observe by the effect on the screen how powerfully that stream is rising. I have here a paper balloon, and in this balloon I will catch the column of heated air. If I am successful we shall by-and-by get the balloon filled with the hot air, and then we shall make Mongolfier's celebrated experiment. You see the sides are swelling by this heated air being accumulated inside the balloon. I will now let it go out of our hands, and I venture to say it will sail upwards. There it goes. It has not gone so high as it ought to have gone, but still it will answer for philosophers as an illustration of the balloon of Mongolfier.

It is found that in the case of solids and liquids the expansion is exceedingly irregular. The co-efficient of expansion varies very much. But strange to say—(and I wish I could go into the reason and tell you why)—in the case of really perfect gases it is essentially the same for all. If you take 490 cubic inches of air and heat it one degree it becomes 491 cubic inches, so that the fraction $\frac{1}{490}$th is the co-efficient of expansion of air; and this co-efficient, as I have said, is almost exactly the same for all gaseous bodies whatever.

Now I have to direct your attention to some experiments with regard to the action of heat upon liquids; and with this view I have provided an apparatus (Fig. 3) which I will



now ask Mr. Cottrell, the assistant, to place upon the end of the table. I will now cause the water in this flask, F, to boil, and I want to show you now what is meant by the vapor of water. We will apply heat to the flask, in which is a quantity of water, and after a little time the water will boil and bubble up. I want you to understand accurately the meaning of this bubbling up. What is going on at the present time in that flask of water is this. The water is heated. As the heat becomes more and more intense this shivering, quivering, vibratory motion becomes more and more intense, and then particles of water are jerked away from the upper surface, and carried away into the space here above. After a time the water begins to bubble. Here you have the bubbles of steam rising to the top. Now, the surface of the liquid is in communication with the air. Every square inch of the surface of that flask of water bears a pressure of about 15 lbs. and every little bubble there bears a pressure of several pounds. Why is it that the bubbles are not crushed? Simply because the pressure of the vapor within them is exactly equal to the pressure of the atmosphere without, so that the film of liquid is squeezed between the air on the upper side and the vapor on the lower side. If you lessen the pressure of the vapor within, you will have the bubble crushed by the pressure of the atmosphere. The boiling point of a liquid is precisely that temperature at which the pressure of the vapor of a liquid equals the pressure of the atmosphere. Now, by turning this tap *y*, I have inclosed in the flask some heated water; and you see that at the present time it is quite quiescent. The vapor in the flask is pressing upon the surface of the liquid. But if I take that pressure away, I have no doubt that the water will again boil. How can I do this? I have in connection with this flask of water another globular glass vessel, G, from which the air has been drawn by means of an air-pump. Hence the inside of this globe is a vacuum. Now, if I turn the cock, *c*, which is between the flask and the other vessel, I open a way for the vapor in the flask to go from the surface of the liquid into the vacuum. Observe what occurs. The liquid is relieved of the pressure which was upon it, the water begins to boil, and the flask immediately becomes filled with the vapor of the water. The sides are now quite clouded. We can actually boil that water by cooling it. If the water in the flask were near its boiling-point, and we plunge cold water upon the upper part of the flask, we should condense the vapor above the liquid, and by hus relieving the water of the pressure on it we should cause it to boil. Here I have a tin vessel containing steam, and the air from which has been chased away by the steam. Mr. Cottrell will place it in front of the table. I will withdraw it from the flame, and I will in fact cause the water in it to boil by placing a piece of ice on the top of the vessel, [This was done.] The water is now boiling away, as the boys near at hand can see. Why? Beccause the vapor above the water has been condensed, and when the pressure is then removed from the surface of the liquid, ebullition takes place. If more ice is placed on the top the water will boil still more, but the atmospheric pressure will, perhaps, crush the vessel entirely in. This effect will be due to the reduction of the pressure of the vapor on the inner side of the tin vessel. [The effect anticipated was not produced, but the experiment was repeated at the beginning of the next lecture, and the sides of the tin can were then successfully crushed. The lecturer informed the audience that it had been found that the failure in the present instance was due to an accidental air hole in the side of the tin vessel.]

I have now to pass on to a consideration of the vapor of water. I have here the two gases or substances of which water is composed. I will show you first of all that one of these is a certain gas which is inflammable, and this gas we call hydrogen. Mr. Cottrell is now getting me some hydrogen which has been actually produced by the decomposition (to use a learned term) of water. He will now give me this gas. We hold downwards the mouth of the vessel containing it, as it is excessively light, and would escape if the vessel were held upwards. I will ignite this hydrogen, and you see what occurs. It is an inflammable gas. There it is burning with a flame at the top of the tube. Now the assistant will give me some of the other gas which is a constituent of water, and here we shall find our familiar friend oxygen—that gas which causes bodies to burn so brightly when they are placed in it. I will introduce into the oxygen a small bit of wood with an ember at the end; and what is the consequence? The glowing wood immediately burst into a bright flame. This gas is the other of the substances of which water is composed.

Now I will take the two gases mixed together, instead of having them in separate tubes. I have here a wonderful instrument—a galvanic battery—which enables me to tear asunder the particles of water. Mr. Cottrell will now connect the vessel of water with the battery, and we will let the decomposing gases escape into soap suds. [The mixed gases from the decomposed water were caused to form bubbles with the soap lather. The lecturer then placed a cluster of the bubbles on the palm of his open hand, and exploded them by the application of a light.] How must you figure this act of the combination of hydrogen and oxygen? I suppose you must figure it in this way. You must figure them rushing together with a great clash, and then quivering and recoiling in virtue of their resilience—their elasticity As far as I can follow the thing in my mind the flash is due to the collision between the particles of the oxygen and hydrogen. It is due mainly to the enormous heat produced by the collision; and the heat produced by this collision is so great that for a time the molecules of water produced are so hot that they are preserved in a state of invisible gas. Water is composed of oxygen and hydrogen in the proportion of two atoms of hydrogen to one of oxygen; and two atoms of hydrogen and one of oxygen constitute what is called a "molecule of water." *Molecule* is the term employed to express that combination, and you must remember the term.

I want to show you the difference between vapor and invisible gas. This room is filled with invisible vapor; but here, early in the lecture, I placed this vessel containing something very cold—a freezing mixture; and this frost which you see upon the outside of the vessel is due to the condensation of the aqueous vapor which has come from the gas lights and from the lungs of the persons here present. That vapor has been condensed on the cold surface of the vessel containing the freezing mixture, and then frozen into hoar frost. The fog through which you were kind enough to come on Thursday last to this place was not a true vapor. It consisted of particles of water. Here you see the same thing. The steam which you see rushing from this vessel is not a true vapor. It is due to the vapor cooling and being precipitated. If I allow the steam to pass through this flame it is converted into a true vapor. The steam is now water, now vapor. [Passing the steam jet through the flame, and thus rendering the steam invisible.]

After a time we shall have that vapor cooling and falling into the state of water, and then if we cooled that water still more the particles would bring other forces and powers into play; and those are the forces and powers that I now want to

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illustrate before you. I want to exhibit to you the marvellous force of crystallization. When we cool water sufficiently it becomes, as every boy knows, reduced to ice. That ice is one of the most wonderful things on the face of the earth, and in another lecture I shall dissect a piece of ice and show you how wonderful it is. I want to show you something similar to what occurs on your chamber windows when they become frosted during the cold nights and covered with forms as beautiful as vegetable forms. I show you that in this way. If I took this piece of glass and poured a solution of common table salt upon it, and allowed it to remain, the water only would evaporate. The salt would be left behind incrusted on the surface of the glass. You can make the experiment at home with the greatest ease if you drop a little solution of sugar upon glass and allow it to stand. You get the water evaporated and the sugar remains behind. Now I want to do the same with a solution of another substance. First of all I must clean the glass plate perfectly, and this I do with potash; and then I shall put on it a film of a solution of something—not sugar, not salt, but something which will give me crystals more beautiful than either of them. We will take a liquid containing a certain kind of salt in solution, and I will pour this liquid upon the glass plate. I want to evaporate this film of liquid before you, and show you the crystallization of the substance. [An image of the moistened glass plate was projected on the screen. Crystals began to appear in the course of a few seconds, and gradually spread over the surface of the plate.] See how splendidly these crystals form. See them building themselves together in this wonderful way as if they were forming vegetable growths before your eyes. This salt is ferrocyanide of potassium. We will take another plate, and cover it in the same way with a solution of chloride of ammonium. I will warm the plate in order to hasten matters. [This plate was also represented on the screen, and a similar result was obtained as in the last case.] How beautifully these crystals run together. There they are, darting out like spears. This is an experiment which one makes hundreds of times, but still it is sufficient to strike one with wonder. How beautifully the crystals assume their determinate forms.

One minute more. I want to tell that in passing from the liquid to the solid state—in falling together so as to form those beautiful crystals—certain bodies, comparatively few in number, become larger. Water is one of these bodies, and that is the reason why ice floats upon the water. When water freezes it expands with powerful force. The bomb-shell which I placed in the bucket before you was, as you see, burst by the expansion of the water in the act of freezing.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

The Flying Spider.

MESSRS. EDITORS:—For the reason that there are so many things in nature of which we are unable to give a rational solution, I feel reluctant to contradict Father Babez's account of the flying spider, which appeared on page 53, current volume. I have in my mind many times threatened to call the attention of entomologists to the investigation of their habits. I have been a tolerably close observer of them for twice fifteen years, and am strongly inclined to the belief that the Rev. Father has been deceived—that his spidership has practised a "slight of hand performance" on his vision. Spider No. 1, that lit upon the leaf of his book, in all probability, had a line attached to the limb to which he ascended. Spider No. 2, which was "lying on its back with its legs doubled up," was doubtless holding its ball of twine there, which had been used on a former occasion, with one end of his string also attached to some stationary object. It is not at all strange that the thread on neither occasion could be seen; this spider, by a very slight manipulation, with what may be considered as the thumb and finger of its right hand, could lay hold of the cord and take its weight from the table, when it would swing, or seem to float off on his back. Had the Rev. Father passed a rod immediately over it, as it began to move off, it would soon have found itself on its back on *terra firma*.

Among the hundred varieties of spiders, there is but one of the real flying kind, although the "cat spider," that always leaps on its prey, instead of entangling it in his web, will sometime swing off by its thread, and various other kinds will be blown from one tree to another, and weave their gossamer with geometrical precision in mid air between them; yet none of these indulge in balloon voyages.

The flying spider is a pale, light, ashy colored insect, or rather animal, and in this latitude thousands of these little aeronauts may be seen every autumn, vieing with each other in sailing the highest. They seem to be chemists as well as mechanics. They get themselves in a state somewhat like the silkworm before it begins winding its cocoon; nearly all that is inside of their bowels is formed into silken thread, and being thus rendered very light, they wait for a fair day and gentle breeze, when by hundreds and thousands, like birds of passage, they undertake their airy journey. Firstly, they climb upon some shrub, tree, or fence, where they stand awhile with their legs directly under the body, and to all appearance inflating themselves with gas, until the back part of their bodies become semi-pellucid. When fully ready, one does not wait for another, but proceeds to attach its cord to the object on which it is standing, then leaps up and off, fearlessly giving its body to the breeze, gradually rising like a kite until it reaches the end of its string, being generally high up and out of sight. I presume a moderate breeze would carry them a long distance after their thread was broken. I have seen them rise higher than the tallest trees, and disappear in the blue ether, but I have never failed to bring them down down when suddenly cutting their thread as soon as they had made their leap. If, however, they rise twenty or thirty feet before their thread is broken, they are safe, for the breeze will carry them out of harm's way, though they will then rise but slowly. Occasionally, after one has started, another will run up his line with great rapidity some fifteen or twenty feet before throwing itself to the breeze. On the whole, it is both interesting and entertaining to observe their movements.

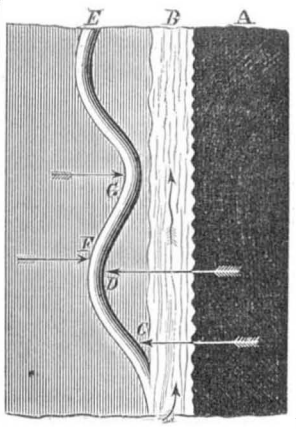
I have written the foregoing with the view of calling the attention of some professional entomologists to the subject.

South Union, Ky. H. L. EADES.

An Attempt to Explain the So-called Heat Shadows.

MESSRS. EDITORS:—In number 3, current volume, of the SCIENTIFIC AMERICAN," Mr. G. A. Shufeldt, Jr., gave as an observation what he called "heat shadows." He asked for an explanation of the phenomenon, and you gave your opinion, doubting that what he observed were shadows. In reading Mr. Shufeldt's observation, I remembered having observed the same phenomenon, but did not investigate the cause of it. I came to the conclusion that the same effect would be produced whenever hot and cold air pass through each other. The sun was shining through a window in the room, the air in the same was heated, the atmosphere outside was cold; I opened the window, and on the window sill and carpet a wavy, vibrating mass of lights and shadows came moving in; no motion was visible in the air, but on the window sill and carpet it was very marked. When the flow of air became stronger, the lights and shadows would move faster; but as soon as I closed the window the phenomenon ceased. This is certainly a proof that the moving lights and shadows were caused by the moving and intermixing of the heated and cold atmosphere.

For close observation, and to determine the cause of those lights and shadows, the above mentioned experiment is not sufficient; the contrast is not great enough, a greater heat than that of a room is necessary to bring out the lights and shadows more prominently. I then had a little stove heated, that came within the rays of the sun; back of it I placed a white sheet of paper, and the same phenomenon was observed, only better defined. The shadow of the stove stood out prominently; the sides of the same were not a straight, but a trembling line, like the teeth of a saw. Next to the stove shadow came a marked stream of light of about half an inch in breadth, trending from the stove, rapidly vibrating and moving upward. From this stream innumerable streams of lights and shadows came winding out, and moved in wavy lines upward, approaching to and receding from the bright, vibrating stream. What produces those lights and shadows? I will endeavor to explain this with the accompanying diagram.



The dark shadow, A, represents that of the stove, the light band or stream, B, next to it, is the extremely heated air, more rarefied, and consequently more transparent and a better medium for transmitting light. The arrows, C, D, pointing outward from the shadow, represent the expansive radiating force of the heat. At C, this force loosens the band or heated layer of air, E, and carries it outward; at D, the force of the heat is lessened and overcome by the pressure of the cold air represented by the arrows, F G, which forces the heated band, E, towards the heated layer, A, until its force is lessened by becoming heated and overcome again by the expansive force of the heat, and the second wave is formed. The vibrating, wavy motion of the heated air continues, and is observable some distance after having passed the sides of the stove, except the light band, A, which does not leave the same. The appearance of the loosened bands or layers of air were either light bands or, as represented in the diagram, had their sides toward the stove shaded; the opposite side was a bright, marked line. The above described phenomenon is no doubt visible, first, by the refraction of light through layers of heated air whose property of transmitting light has been changed from that of the cooler air; secondly, by the wavy, vibrating motion.

The same effect can be observed by pouring water in a porcelain plate and setting it in a wavy motion, the refraction of the light through the different thicknesses of the waves will be seen as lights and shadows on the bottom and sides of the plate. The wavy motion of lights and shadows at the opened window can be explained on the same principles.

Philadelphia, Pa. AUGUST WILHELM.

Another correspondent on the same subject says:

The vibrations of air under certain circumstances are distinctly visible to the human eye, and air thus vibrating casts a visible shadow. A metallic surface and artificial heat is not essential to the production of these visible vibrations. The warm rays of the sun often cause a visible motion of the air nigh the earth's surface. By a peculiar optical illusion, the moving air often appears at rest while objects seen through that medium are apparently vibrating. But not always. When heated air is ascending from the earth's surface. laden perhaps with misty exhalations, but performing its irregular motions with medium rapidity, its vibrations are not extended to the object seen through that heated air, but the air itself is visibly in motion. Heated air rising from a register, or common stove, is distinctly visible when a person stands so that the column of rising air is between him and a window. Occasionally, when this heated air was making its tremulous motions with unusual rapidity, I have witnessed upon a neighboring window the same optical illusion that I have seen in the fields and on the seacoast. The moving air seemed at rest while the window appeared tremulous with motion. This occurs, however, only when there is intense heat in the stove and the remaining portion of air in the room is cold. I have often stood in halls and churches with a perpendicular piece of pipe between me and a neighboring window, and watched the vibrations of the air. These vibrations had all the irregular, wavy, tremulous appearance which characterizes a rising volume of steam. They extended to the distance of about three feet each side of the pipe, the motion becoming less and less apparent, and the volume less dense, as it extended further from the pipe.

A kerosene lamp with a tube from one and a half to two inches in diameter across the top, in a room nine feet high, will cast a circle of light about twelve inches in diameter, upon the ceiling. This circle of light is bordered by a dark circle, which is the shadow of the upper edge of the tube. Within, but next to the dark circle or shadow, is a circle of light in which no tremulous motion is visible, while in and around the center of this circle of light is a shadow, dimly defined, but rapid and tremulous in its motions. This shadow has no connection with the shadow of the tube. The tube, the circle of cool air next the tube, and the column of heated air rising in the center of the tube, all have their portions on the ceiling. The tube has its shadow, the cool air which encircles the inner surface of the tube has its circle of motionless light, and the column of moving air its dim, tremulous shadow. If a person sits by a common stove, with a brisk fire, so that the rays of the sun shine upon and above the stove, with the stove between him and a window, the vibrations of the rising air can be easily seen; and if the wall is capable of receiving a delicate shadow, the shadow of the moving air will also be visible.

Not long ago, one frosty morning, I was sitting by an air-tight stove. A pipe about two feet in length passed from the stove through a zinc fireboard. The rays of the sun fell upon them, and the shadow of the pipe and damper handle were as clearly defined upon the zinc as shadows usually are. There was no motion apparent in the shadow of the pipe, even along its edges. Below and south of the shadow of the pipe there was nothing but the motionless rays of the sun. Above the pipe, extending its whole length and rising to the distance of fourteen inches, was a dim, tremulous shadow. The question naturally arises, what was it we saw moving so distinctly; what cast this delicate, tremulous shadow? Was it the vibrations of the air, a delicate cloud of dust, or a misty exhalation? A misty exhalation could not have arisen from the top or sides of a heated metallic surface, or from the tube of a burning lamp. A delicate cloud of dust would have been as perceptible through the rays of the sun in other parts of the room, and as distinct at the distance of four feet from the pipe as they were at the distance of three. Then the substance we saw in motion must have been the air, and the tremulous shadow we saw was the shadow of the moving air. We may safely say, then, that air moving in a straight line, or in gyrations, is invisible and casts no shadow; but when it moves in a peculiar, wavy, irregular manner, like mist and steam, its vibrations are visible, and its shadow tremulous and delicately defined. HORATIO NOBLE.

East Windsor Hill, Conn.

Effect of Darkness and Silence.

MESSRS. EDITORS:—Under the above heading a report appeared on page 42, current volume, from Dr. Ralls Smith, who is said to be "confident that the sense of hearing, as well as that of sight, is lacking, among the fishes in the mammoth cave."

Allow me to remark, that Prof. Agassiz, and Prof. Wyman, have demonstrated that the fishes in the cave, of which there are several species, are all blind; that they all have rudimentary orbits, developed in some species more than in others; but that at the same time all have large well developed auditory organs, even larger in proportion than ordinary fish. See "Silliman's American Journal," for March, 1854.

Prof. Silliman visited the cave in 1850, and states that the cave rat possesses, when first captured, a very imperfect, if any, sense of vision, which, however, appears to improve when kept long in the light; but this same rat is extremely shy; and notwithstanding the cave is full of innumerable tracks, they are seldom seen, as they flee when hearing the approach of man.

Dr. Smith asserts that these animals are deaf, because there is nothing to be heard, forgetting that they make sounds by their own movements, and produce articulate sounds. It would be more probable that very acute hearing in these animals compensates for the loss of sight, as is the case with the blind in general. *

A Standard Time for the Whole World.

MESSRS. EDITORS:—The annihilation of distance by the telegraph must have forced upon many minds the necessity of establishing at some point a timepiece which shall govern all the rest of the world, a time distinct from the "local," and which shall point to 12 o'clock at the same instant all over this sphere. The hours must be numbered from 1 to 24, inclusive, in order to distinguish it from local time, thus doing away entirely with A. M. and P. M. (when using standard or universal time); 12 then would mean midnight only at the governing point, while 24 would mean noon at that point. For the rest of mankind it would be a certain guide for all official purposes. Railroad-time cards would no longer perplex the

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public, and trains would run on a uniform time everywhere. Every watch would have its two sets of hands, one for the local and one for the universal time.

A telegram sent from London to San Francisco, bearing the standard time at starting would show to the recipient thereof exactly how long it took to reach him, how much *actual* time *actually* consumed.

As it is now, no one can have a near idea without considerable figuring and then he may be figuring 24 hours too early or too late.

Every telegraph and railway office would receive its time daily, so that no where would the "times" be a minute "out of joint." January 31, 1868, 1 o'clock, would be January 31, 1868, 1 o'clock, all over the official world.

What a fine regulator of local time this would be: we should always have one right by having the other correct, there being always the same difference, so that should we know one we would know the other. Suppose, then, that Greenwich be the standard *time* as well as the calculating point for longitude.

There is a still better plan than this, but it so entirely supplants so many familiar terms, such as "noon," "morning," "evening," when used in connection with breakfast, dinner and tea, that it would go a little hard at first, though I have no doubt that, at some time, there will be but one time, and here at Cleveland it will some time be perfectly natural and easy to say "dinner at six o'clock," which would mean somewhere near our present time, 1 P. M. F. A. STUMM.

Cleveland, Ohio.

What Comes from the Ash Barrels?

The following, from the pen of Mrs. Frances D. Gage, published in the *Ohio Farmer*, is a good description of low life in this city. The number of inhabitants accorded by the writer is by far too small, however; twice that number, one million, would be nearer correct:

It is an old saying, and a true one, that "one half of the world does not know how the other half lives." Here in New York are nearly half a million of people. Rents are enormous—a garret, five stories in the air, low, dark, unblest with any modern improvement, usually rents at five to eight dollars a month at the lowest. Beefsteaks at forty cents a pound, and everything else graduated proportionally.

How do the poor live?

You may well ask the question, and we may ask another, which puzzles us quite as much. How do the common class, who are not poor, live?—for I call no man or woman who has two good hands, a healthy body, and a reasonable brain, poor. But live they do; and were you to see many of them upon the street, you would never dream that privation or want had been their neighbors, much less their intimate bosom friends.

"Out of my window," I can see across the street, in a little nook or enclosure at the end of a stately brick house on a corner, five stories high, and fronting upon two streets, three ash barrels, which were to me a wonder and a revelation for many weeks, as I sat in my arm chair, helpless and glad to aumse myself as I could. Every morning the barrels were full to overflowing—every evening they were empty. And what of it? the thoughtless dweller in the country will ask.

Much, my friend?—much that leads out into by-ways and highways, that, if we dare to follow where they lead, would open to us doors of trade, commerce, agriculture, and mechanism, that would astonish and interest, and perchance amuse, or stir up in the depths of our souls sympathy and kindness, and care and economy that has never before been awakened into active existence.

A very simple thing it is to fill the bucket with the worthless coal ashes in the morning, and carry it forth to fill a hollow or ravine in the garden, or build a crossing over a muddy street in the country town or village; but the ash barrels of the city have a more complicated history.

The brick house on the corner has at least one hundred tenants; every room, nook, and closet swarms with human life. A liquor store, a grocery, a tier of rooms occupied by women who work; seamstresses, tailor shops, nurseries, and I know not what. Each one of these families, or lodgers, brings down at morning his or her bucket of ashes, pours it into the barrel, and retires to the nook whence he or she came.

Now commences the process of distribution. An old woman, with a bag on her back, half bent, her old greasy hood and her tattered garments making one feel piteously for her age, her limping limbs, and heavy burden, comes up, lays down her pack by the barrel, and with a long iron hook turns over the contents of the same. Every scrap of paper, every bit of rag, every paring or thread that can be turned to account, goes into her bag and adds to the bulky load under which she bends. On she trudges to the next barrel in the next yard, only too gay if she is the first to glean. She is followed (if she is not crowded away) perhaps, by a rolicking boy; he comes with a hop, skip and jump round the corner; startles you with a shout or whoop that a Cheyenne might envy; he shakes up the barrel and takes every atom of coal and cinder that has an atom of carbon left in it, with which the miserable dweller on some more miserable street can cook a breakfast; his little sister brings up the rear and gathers out the bones, apple-skins, potatoes, and bits of anything that can possible feed a pig, or be cleansed to satisfy the "aching void within" of some poor hungry beggar.

Thus thousands upon thousands live; the old woman is the rag-picker, and will enrich the paper mill. A hundred thousand such ask barrels of the city give to our paper mills, shoddy establishments, and bone factories, material for buttons, knife handles, combs, harness rings, everything into which a bone can be worked; and then the debris is ground into dust, used for many things in commerce and trade.

Every particle of vegetable matter is useful; and when perhaps twenty of these street scavengers have shaken up and turned over the barrels of a morning, then comes the ash-man, tumbles all that is left into his cart, and drives off to deposit it where it will make a low, sunken lot up town, worth by-and-bye a thousand dollars per foot, that in its natural state was not worth a bucket of ashes. Perhaps he dumps it into his muck-pile, with stable manure and other debris, which sells for three or four dollars a car-load, to be taken into the country to enrich gardens and fields, and return again the wealth of which they have been robbed in the summer.

Why do people stay, do you ask? Because they can't get away, they know not where to go; thousands can't speak a word of English: thousands and tens of thousands find trades and openings for labor and bread-earning in this great, toiling city, that might hunt for months in the country for congenial employment and not find it. Nor would they know how to boil a potato well in our American kitchens: but they know how to make a living out of ash barrels. And many a poor woman thus keeps in bread and clothes a whole family of children, who perhaps are sent to the excellent New York public schools, and grow into respectable men and women. Truly, one half of the world does not know how the other half lives!

Nearsightedness.

Any one who has good eyes knows that a manuscript which he can read perfectly at the distance of three feet, can also be read as he brings it nearer and nearer to the eye, until only a distance of three inches intervenes. At three inches' distance, reading becomes difficult, and at two, hardly possible. A change has taken place in the interior of the eye, attended by a certain effort, to obtain this near sight; from optical reasons, the pupil must make a large curve in order to throw a picture of the object so close to the eye on the retina. This extreme convexity of the pupil is contrived by the action of a muscle at the back of the eye, called the accommodation muscle. For distant sight it is inactive, as the pupil requires only the ordinary gentle curve. But if that muscle is acted upon, a pressure at the back is felt; consequently, the most compliant part of the soft young skin at the back of the eye is distended, and the axis of the eye lengthened. If, then, the use of near sight is prolonged, if the pupil has not time to return to a level, if the muscle cannot repose, the continued effort will end in short sight. And it is not alone by this forced exertion, but also by the overabundance of blood in the veins of the retina, that the interior of the ball is enlarged. Such an overflow is generally produced by the return of the blood from the eyes having been arrested. This may be caused by the forward inclination of the head, and will infallibly lead to myopy. As it is, then, undoubtedly a fact that long attention to an object placed close to the eye, the head being bent down, will render healthy eyes shortsighted, we arrive at the consideration whether the furniture of the schools has anything to do either in hurting or repelling myopy.—*Bentley's Miscellany.*

Pneumatic Railroad and Country Homes.

In the language of Macaulay, "of all inventions, the alphabet and printing press alone excepted, those inventions that abridge distance have done most for the civilization of our species."

The observation of every thoughful man confirms this. Speed is the great civilizer and equalizer, for by it, the man who does business in Wall street, lives practically nearer his office if his home is in Newark, 8 miles off, than if he lived in 20th street, not half the distance away.

Enlightened philanthropy will eventually provide country homes for city laborers, as enlightened views of life have led so many professional and business men of the city to provide country homes for themselves and families. What railroads with a speed of 20 miles an hour and high fares have done and are doing for the wealthy; roads that will carry us 60 miles an hour, with low fares, would do for even the very poor whenever their labor is in demand in the city; and when it is not, their condition in the country would be far preferable to their present crowding in the disease-breeding cellars of the town.

Trains on pneumatic roads are in no danger of obstructions from malice, from snow, slides of earth or rock; or collision with men, beasts or vehicles, of running off the track, or of setting fire to buildings, stacks or woods; they relieve passengers from the smoke, cinders and dust that so oppress and injure eyes and lungs, and defile person and clothing; the roads can be built under cities, farms, gardens and pleasure grounds, thus greatly diminishing the damage done to property and consequently the cost of the right of way, dispensing with fences and leaving no land as a nursery for weeds; it is claimed that they can be built for the same cost as common railroads, be operated more cheaply; and are capable of higher speed. If these claims can be substantiated, pneumatic roads effectually solve the question, "How shall the laborers in our cities be housed?" Homes in the city *may* be as good for adults as homes in the country, but for children they *cannot.*

In addition, however, and auxiliary to these roads, men actuated by the spirit and resources of Peabody and Stewart, should buy 2,000 to 20,000 acres of land, from 20 to 40 miles from the city, accessible in as many minutes, lay it out into half acre lots, with streets, parks, church and school sites, houses, gardens, fruit trees and shrubbery; drains, water, sewers and gas, supplied in accordance with the best known methods, then sell or rent at a fair advance or interest on cost, and the poor as well as the rich, would have at command the facilities of improvement and innocent enjoyment which are so much more abundant in country than in city, and especially would exist in such a combination of city and country as is here suggested.—*Working Farmer.*

Valata Water Proof Cloth and Paper.

S. C. Bishop, of this city, has patented an application of valata gum, as follows:

"By soaking, macerating, and rolling in an even sheet, upon a web of cotton or other cloth previously coated or saturated with the substance, valata or balata, a gum which is obtained from a tree or plant indigenous to English, French, and Dutch Guiana, and other portions of South America, and which possesses, for the purpose of water-proofing, some advantages over both india rubber and gutta percha, as it needs no vulcanization like india rubber; and besides, being capable of withstanding a much higher temperature than gutta percha, is less friable and brittle than the latter substance. A most servicable water proof cloth, therefore, is thus prepared, by sheeting out valata or balata in connection with cotton or other suitable cloth, which may be applied to the manufacture of hose, or any other purpose for which water or damp proof cloth is required. In some cases, instead of the fully developed gum, the milk or milk juice of the younger shoots of the same tree may be used and applied to the cotton or other cloth by a brush, and the whole afterwards run through heated rolls.

"My invention has also for its basis or object the utilization of valata or balata in the manufacture of water or damp proof paper, applicable, among other purposes, as a substitute for parchment, and for making collars, cuffs, envelopes, bank-note paper, boot or shoe soles, and packing paper for silks, jewelry, and other purposes, where paper may be used, and which it is desirable should have a water or damp proof character. In the manufacture of my improved damp proof paper as prepared from or with the gum, the latter may be soaked, macerated, and rolled as india rubber is sheeted, and passed between calender-rolls with the sheet of paper applied to it, either on one or both sides. It may thus be made either in single or two or more thicknesses, the adhesive property of the gum serving to effect the union of the sheets."

DRINKING QUALITIES OF WATER.—In a recent communication to the Chemical Society of London, it was stated that the noxious qualities of ordinary drinking water did not result usually from any mineral substances that might be dissolved in it. Ammonia should not be in appreciable quantity; but lime salts, while causing hardness, do not appear to affect the health. Nitrates too, alone, seem harmless, but when several of these substances occur together, the mixture seems to favor the rapid development of low forms of vegetable life, which are positively injurious. Experiments have been made in supplying pigeons with water containing these vegetable organisms, and it was found that they were purged almost to death; recovering, however, quickly, when the water was changed. The purification of such water, either by efficient filtration or by the precipitation of the organic particles, becomes clearly a necessity, if health is to be preserved.

OAK-FEEDING SILK WORMS.—At the last session of the Royal Dublin Society, one of the members reported that his attempts to rear the Japanese silk worm in Ireland had been comparatively successful, and from the results obtained he was inclined to believe that the species could be easily acclimatized, and that before many years a new and important branch of industry would be opened from this source. The great disadvantage that the foreign worm labored under in that climate was that the worms were hatched before the oak trees leaved.

A TALE OF TWO CITIES.—The Cheyenne papers having asserted that their city, boasting a population of seven thousand inhabitants, was probably the only city in the world free from rats, the Salt Lake *News* replies that its city is a place twice as large as Cheyenne, and twenty times as old, yet the presence of one of these generally well known rodents in Salt Lake would prove as great a natural curiosity as a chimpanzee in the streets of New York.

THE SYSTEMS OF SIGNALING and telegraphing adopted by government are now uniform in both our army and navy. The cadets at West Point and the midshipmen at Annapolis receive the same instructions, so that when they become officers in any contingency of land or naval service, they will be enabled to open and maintain communication, by codes of signaling and electric telegraphy identical in their operation.

THE entire amount of gold in the world at the present time is estimated at about $5,950,000,000 in value. If melted together it would make a lump of 660 cubic yards. If beaten out into gold-leaf it would cover an area of about ten thousand square miles, a tract one-hundred miles square, less than the extent of Vermont, and little more than a fifth of either New York or Pennsylvania.

IT is said that omnibus signals have been introduced into Springfield, Mass., by which those who want to ride can communicate their wishes to the drivers. The character of the signals is not given, but anything would be preferable to the want of means of communication between passengers and driver now the rule in New York coaches.

PRESERVING EGGS.—A correspondent, I. H., of Chicago, Ill., writes that he is now using eggs two years old, preserved by a recipe which he has successfully tested for eight years. He gives it as follows: 1 peck good lime; 2 oz. cream tartar; 1 teacup of table salt. Slake the lime with hot. soft water; when cold, stir in the salt and tartar.

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Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

BEARING FOR SHAFTS.—John F. Laplace, Hamburgh P. O., Conn.—This invention relates to a new device for supporting the ends of vertical and inclined shafts, and of such horizontal shafts as are arranged in vessels, and which are, by the rocking motion of the vessel, liable to be thrown into an inclined or vertical position.

PIPE CUTTER.—Geo, B. Kirk, Newark, N. J.—This invention relates to the cutting of pipes or rods, and consists of a stock containing a cutting tool which is made to traverse around the pipe, and thereby cut a section of the same at right angles to the axis.

APPARATUS FOR STRAIGHTENING DEFORMED LIMBS.—H. R. A , M.D., Charleston, Ill.—This invention consists of an apparatus for overcoming the deformity of the lower extremities when such deformity consists in the abnormal flexion of one or both of the lower limbs, as in some forms of anchylosis, or of club foot. It consists of a frame provided with straps to retain the limb firmly within it, and further providing the said frame with joints for flexing the same to fit the limb, together with springs for exerting a continual straightening tension, and other devices, perfecting the whole.

BOILER SCRAPER.—Auguste Poriel, New York city.—This invention relates to a new device for cleaning boiler tubes, and consists in arranging a series of disks upon a straight bar, said disks being held a suitable distance apart by means of washers interposed between them.

SHEARS.—A. H. Rennie, Binghamton, N. Y.—This invention consists in the use of one or more wheels which are attached to one of the blades and which are connected with the other blade by crank motion or its equivalents, so that when the handle of the immovable blade is grasped, and the wheel or wheels are placed on the counter and the shears then moved forward in any desired direction, the other blade will be set in motion by the revolution of the wheels, and will cut cloth or paper as quickly as the device is moved forward.

MILL STONE.—James Campbell, Peoria, Ill.—This invention relates to a new and useful device for conducting fresh air between a pair of mill stones and expelling it from the curb for the purpose of cooling the stones and carrying away the vapor arising from the friction when they are grinding grain.

PICKER FOR LOOMS.—Richard Leach, Linwood Station, Pa.—This invention relates to improvements in the construction of a picker for looms and consists in arranging and securing strips of leather upon the staff in such manner that the picker shall be very durable, while, at the same, it is exceedingly cheap and easy of construction.

SULKY HORSE HAY RAKE.—C. O. Luce, Brandon, Vt.—This invention relates to an improvement in the construction and arrangement of a sulky horse hay rake, and consists in attaching curved metal rake teeth to the axle instead of an independent cross-head, and connecting the thills to the axle by straps, or otherwise, so that the axle can turn freely and independently, instead of being rigidly connected with the thills; and further, in a segmental gear connection between the axle and the thills by which, at the pleasure of the driver, the rake teeth map be raised and lowered, while also, a clearer rod is worked by the same movement.

DIE PRESS.—John Mays and E. W. Bliss, Brooklyn, N. Y.—This invention relates to an improvement in a die press for heavy work, and consists in forming the sliding head or plunger with guides working in brass gibs set in solid cast boxes, and arranged in such manner as to be adjustable, to compensate or wear, and to be perfectly rigid and true in operation.

VEGETABLE CUTTER.—J. Caldwell, Chillicothe, Ohio.—This improvement relates to an improved vegetable cutter.

BURNER.—S. C. Pruden, Harmony, Ohio.—The present invention relates to a new and improved burner or tube for coal oil, and other similar lamps.

TRY SQUARE.—H. L. Ogden, Atkinson Ill.—The present invention consists in so constructing a try square as to adjust itself to the edge of the material, and to afford a means of indication by a graduated scale, of the amount of accuracy in the work, whether it be more or less right angular.

REIN HOLDER.—Chas. A. Bradford, and Wm. Bradford, Crown Point Centre, N. Y.—This invention relates to an improvement in rein holders.

GRATES FOR STOVES AND FURNACES.—John W. Griswold, Philadelphia, Pa.—This invention relates to an improvement in the construction of grates to be used for stoves, heaters, and furnaces, for vertical steam boilers, or other purposes.

STOVE.—T. J. Frazier, St. Paul, Minn.—This invention relates to improvements in stoves, and consists in an arrangement of a bulkhead and of fines over and through which the products of combustion are led, giving a much greater radiating surface combined with less consumption of fuel than in the form of stove heretofore used.

BRICK MACHINE.—James Simpson, St. Louis, Missouri.—The object of this invention is to construct a cheap and simple machine by which compressed brick may be manufactured in a perfect and expeditious manner.

SINGLE HARNESS.—J. S. Reid, Orange, Ind.—This invention relates to an improvement in single harness, and consists in an arrangement of parts whereby the breeching hip strap, and the greater portion of the traces, are entirely dispensed with.

SOLDERING TOOL.—Joel Gleason, Whitestone, N. Y.—The design of this improvement is to make a solid soldering tool in two parts, and of the same or of different metals, and consists in forming the copper point with a screw in the back end which screws into a cast iron base, with a wrought iron handle, or a base and handle of copper, or any other suitable metal.

METALLIC FILE.—James Hatton, New York city.—This invention relates to a new and improved method of constructing file handles, and handles used for similar purposes, whereby files or screw drivers, and other tools of a similar nature, of different sizes may be used without changing the handle, and whereby the tool is much more securely fastened in the handle, while the handle itself is indestructible.

WASHING MACHINE.—Wm. Eberhard, Akron, Ohio.—This invention relates to an improved washing machine, and consists in a device for attaching to an ordinary washing tub, which device consists of two corrugated rollers, one of which has a slow rotary motion, and the other a reciprocating motion, between which rollers the clothes press and are rubbed.

ICE PICK.—S. Grant Hoyt, New York city.—This invention relates to a new ice pick, which is so arranged that it can be used for dividing blocks of ice into smaller pieces, and for separating such small pieces from the block, and also for breaking blocks into small fragments, which are used to cool beverages in the glass, and for other purposes.

SELF-BREAKING TELEGRAPH REPEATER.—J. H. Bunnell, N.Y. city.—This invention proposes to furnish an improved form of self breaking telegraph repeaters, by which the operator is enabled to do away with extra local batteries, heretofore generally used in all practical forms of self-breaking repeaters, and by so doing away with extra local batteries and the many necessary connections resulting from their use, to greatly simplify the general adjustment and operation of the complete instrument.

CULTIVATOR.—John T. Herndon, Bancroft, Mo.—This invention relates to a new and improved cultivator of that class which are provided with laterally moving shovels, arranged so that they may be moved by the feet of the driver, and also provided with shovels at the outer sides of the laterally moving ones, which, in connection with the latter, may be raised and lowered but have no other movement. The invention consists in a novel arrangement and construction of the parts, whereby a very simple and durable machine of the kind specified is obtained, and one which may be operated with the greatest facility.

CANE MILL.—B. F. Cauffman, Millerstown, Pa.—In this invention a partition is used to separate the juice expressed between the first two rollers with which the cane comes in contact from that expressed between the other rollers. The cane is partially crushed between the first pair of rollers, so as to obtain only a pure, colorless juice. It is afterwards thoroughly pressed by the second pair, and all the juice extracted.

HEAD REST FOR CAR AND OTHER SEATS.—James R. Childs, Richmond, Va. In this invention the head rest is made vertically adjustable by means of a ratchet, and by the peculiar shape of the supporting rod the head rest is thrown forward when the seat is extended or reclined, so as to support the head in a more comfortable position, and dispense with the necessity of a pillow or other support under the head.

SLEIGHS, SLEDS, ETC.—David C. Frazeur, Sidonsburg, Pa.—In this invention the runner is used in connection with a wheel, the two being so arranged and operated that when desired the vehicle may be supported upon the runners, or by simply moving a hand lever, may be thrown upon the wheels, so that it can be instantly adjusted to travel upon snow or upon the bare ground.

MACHINE FOR BENDING TIRES.—Wm. Richardson and Louis Bermiiller, New York city.—This invention combines a new arrangement of gear, by which great power is exerted at the points which require it; and a new method of adjusting the central roller, by which the tires can be more easily applied and removed than in machines used heretofore.

COUCH OR CRADLE.—Robert Hale, Chicago, Ill.—This invention has for its object to furnish an improved suspended couch, or cradle, designed especially for children, but equally applicable for other persons, which shall be cheap, durable, simple in construction, and portable, being capable of being packed in a very small space and carried in a traveling basket or satchel.

CROSS-CUT SAWING MACHINE.—Philander P. Lane and Joseph T. Bodley, Cincinnati, Ohio.—This invention relates to a new and useful improvement in cross-cut sawing machines, in which a reciprocating movement is connected to the saw carriage through the medium of a vibrating frame. The invention consists in the application to the saw carriage, or vibrating frame, either or both, of a center piece so arranged as to equalize the movement of the saw carriage. It further relates to an adjustable or graduated step for the purpose of limiting the backward or receding movement of the saw carriage to suit the length of cut required.

SKATING RINK.—J. H. A. Hervey, Cleveland, Ohio.—This invention relates to a new and improved skating rink, and has for its object the constructing of the same in such a manner that perfect ventilation will be obtained, and the water within the rink allowed to freeze without any difficulty whatever, and kept in a frozen state with a moderate temperature of the external air, the thawing or melting of the ice either from the rays of the sun or a high temperature within the rink being avoided when the external air in the shade is at, or a trifle above, the freezing point.

RECLINING CHAIR.—B. L. Southack, New York city.—This invention relates to a new and improved chair of that class which are provided with a movable hinged back and foot piece, connected together and arranged in such a manner that a person occupying the chair may convert the same from an upright sitting to a reclining chair, and consists in a novel manner of constructing and arranging the several parts, whereby chairs of this class may be very much reduced in the cost of manufacture, far more simple in construction and less liable to get out of repair than those now in use.

LAWN MOWER.—Amariah M. Hill, Hartford, Ct.—This invention relates to a new and improved device for mowing grass by hand, and is more especially designed for mowing lawns. The invention consists in a novel manner of constructing the frame of the machine, and inserting it on a roller, whereby the latter is made to have sufficient traction to drive in the most efficient manner the cutting device. The invention also consists in a novel manner of applying the handle to the frame of the machine, whereby the latter may be pushed along by the operator without at all affecting the equilibrium of the machine on its roller; in a novel and improved cutting device, which may be constructed at a very small cost and still be very strong and durable, and not liable to spring during the operation of cutting; and in a peculiar application of these to the device, whereby the hight of the cut may be regulated as desired.

PUMP LEVER.—Elijah Borton, Morris, Ill.—This invention consists in operating the pump by a cogged eccentric lever, which engages with cogged segments, which also cut eccentrically upon their centers, thereby imparting the required motion to the pump rod.

MACHINE FOR CLEANING AND SEPARATING WHEAT.—Thomas Hancock and John H. Leaman, Richmond, Va.—This invention has for its object to furnish an improved machine, by means of which cockle seed, onion seed, partridge peas, &c., may be separated from the wheat conveniently.

MEN'S SCARFS.—Henry G. Fisk and Thomas J. Flagg, New York City.—This invention has for its object to furnish an improved scarf, so constructed that it may be worn with a standing or turned-down collar, that it will fit all sizes of necks, and may be secured in place without hooks and eyes, buttons, or any other fastening.

CORN PLANTER.—James Gilbert, Wyalusing, Wis.—This invention has for its object to furnish an improved corn planter, which shall be simple in construction, effective, reliable, and accurate in operation.

BABY HOLDER.—Robert Hale, Chicago, Ill.—This invention has for its object to furnish a simple, cheap, and convenient device for holding a baby when left alone in a room, or at other times, or when traveling, so that the child may be protected from danger when left alone, and so that the mother may be relieved from the labor of constantly holding the child when present with it, or when traveling.

STEAM GENERATORS.—Edwin Chapman and Charles T. Allaire, Rochester, Minn.—This invention relates to a new and improved method of constructing boilers for the generation of steam, whereby the steam generating surface is greatly increased; and it consists, firstly, in the peculiar shape and formation of the fire box and combination chamber, and secondly, in the manner in which atmospheric air is introduced into the fire box.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

M. W. H., of Ind.—Cloth is commonly made water-proof by the use of india-rubber in solution or in sheets.

T. C. E., of N. J., asks what is the coating which gives the Russia sheet iron its color and polish. This is a question our iron manufacturers have tried for many years to solve satisfactorily, but hitherto without perfect success. We believe the superiority of the Russian over our own plate is due to the quality of the iron as much as to some secret peculiarity in the processes of manufacture which many Americans have spent years in Russia to find out. In Vol. XVI. we published several articles on "Steam Boilers, Their Form, Construction, and Material," six of them illustrated.

E. A. M., of La.—"Will an air valve two inches diameter be large enough to prevent a vessel six feet diameter by five feet in hight from collapsing if the steam in the vessels suddenly condensed? The vessel is made of three-inch cypress lumber, perfectly sound and clear." Much depends on the form and mode of construction of the tank as well as on the material of which it is composed. The valve is amply large for a tank properly built.

W. N. B., of Iowa.—"What is the best tool for checking gun stocks by hand?" A Yankee would reply "a pocket knife." We think a tool similar to a gager's marking tool would answer admirably. This is a blade, of a peculiar form, fixed in a handle, and having the end made into a V-shaped edge.

R. H. A., of Vancouvers Island.—This correspondent desires information on putting up salmon in hermetically sealed cans, and asks if he need fear explosion of the cans during the process of expelling the atmospheric air and how to determine whether the contents of a can will keep. We have seen the process of preparing lobster meat for market which will probably apply to his case. The meat was separated—after boiling the lobsters—by hand, placed in the cans, then a number of them closed—except a small hole in one end—placed on a rack, and lowered into a tank containing water kept at nearly a boiling heat by steam pipes. The heat expelled the atmospheric air in the form of steam, and soon as that ceased to be visible the small perforation in the top of the cans was dexterously closed by a bit of solder or a small cap of un soldered on. Removal of the cans and their cooling completed the process We think there is no danger of explosion. For an excellent method of soldering the cans we refer our correspondent to page 300, Vol. XVI. of the SCIENTIFIC AMERICAN.

S. M., of Conn., thinks we are wrong in doubting that cast-iron sled shoes run on snow with less friction than those of wrought iron. As the cast iron is cast in chills rendering the surface very hard, he thinks observation will convince any one that cast-iron shoes create less friction than those of wrought iron. There can be no doubt that a very hard, dense, and polished surface is better for this purpose than one of a more open and porous texture.

W. H., of Iowa.—"What amount of power is required to start (run?) a four-feet burr mill stone weighing 1,900 ponnds, the stone to be properly hung, etc.?" Pallett, in his "Miller and Millwright" gives five horse-power for a stone of that diameter. We suppose him to be as correct as any published authority.

D. McD., of Wis., says he has the pipe of his stove ascending several feet in an upright position, then horizontally to a flue in the chimney, which connects, being open, with the room in which the stove is placed. At night he fills the stove with wood, nearly closing the draft, and in the morning the upright portion of the pipe is covered with black streaks made by the distillation and dripping of pyroligneous acid. None of this acid comes down the chimney flue. He asks. "how can I stop the acid running down the pipe when the draft is checked?" Open your drafts and, if you use green wood, burn it instead of distilling it. A sufficient amount of oxygen will produce combustion while an insufficient quantity will merely insure slow distillation; a fact of value to every householder.

S. H. B., of Me., in response to the inquiry of L. D. M., of Tenn., in No. 3, current volume, as to the best recipe for bardening mill picks, says that he uses the following, knowing it to be an excellent bath: 2 galls. rain water, 1 oz. corrosive sublimate, 1 oz. salammoniac, 1 oz. saltpeter, 1½ pints rock salt. The picks should be heated to a cherry red, cooled in the bath, and drawn to temper.

A. L. M., of Ind., asks how to polish plows from the grindstone. Either an emery wheel or an emery belt will do the business.

Business and Personal.

The charge for insertion under this head is one dollar a line.

For Improved Lathe Dogs and Machinists' Clamps, address, for Circular, C. W. Le Count, South Norwalk, Conn.

For Gas-Pipe Screwing and Cutting-off Machines for Hand or Power, or any tool used by Steam and Gas Fitters, address Camden Tool and Tube Works Co., Camden, N. J.

Inventors and Patentees wishing to get small, light articles manufactured for them in German Silver or Brass, address Schofield Brothers, Plainville, Mass.

$300 will buy a Patent of A. Grushus, St. Paul, Minn.

Agents wanted everywhere—enormous profits. Sample doz. $1 50. Retail for $3 each. Thomas Powell, Milroy, Ind.

Wanted, address of parties wishing scale removed from boilers by Winans' Anti-Incrustation Powder, 11 Wall st., N. Y., 12 years' recom's.

Wanted,—To be used in Elk county, Pa., a portable engine and boiler, of 30 horse-power, a circular saw mill, 30-foot carriage, planer, edger, shingle machine, and jack saw. Also, any other machinery connected with saw mill and tannery, if they are sold cheap. Address J. Schultz, Ellenville, Ulster county, N. Y.

One Third Interest in the Athens Foundery and Machine, Works for sale. Having an extensive collection of tools and patterns, a large circuit of custom, being in a healthy section of country, located among factories and mills. It is a desirable investment for a practical man. For full particulars address R. Nickerson, Agent, Athens, Ga.

Parties who have for sale instruments for measuring distances upon roads will please address Geo. C. Knapp, care C. E. Ward, Joliet, Ill. stating price.

Parties in want of a pair of Chilled Iron Rolls, 15-inch face, 9 inch diameter, with frame, can purchase them cheap by addressing Box 2,044, Boston, Mass.

Patent Right for sale. Curtain Fixture, Patented May 28, 1867. The whole patent right for sale. For particulars address C. H. Fowler, Box 35, Jamaica Plain, Mass.

Parties in want of an arrangement to open and close farm gates from team or saddle, which may be attached to any gate for two dollars, address E. Roth, New Oxford, Pa.

Parties in want of superior machinery for the manufacture of Sewing Machine Needles, address R. Thompson, Wolcottville, Conn.

Wanted—a small second-hand tubular boiler. Address J. J. Greenough, Deerfield, Mass.

EXTENSION NOTICES.

Henry Clark, of Cedar Keys, Florida, having petitioned for the extension of a patent granted to him the 25th day of April, 1854, for an improvement in machines for feeding sheets of paper to printing presses, for seven years from the expiration of said patent, which takes place on the 25th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 6th day of April next.

Nelson Gavit, of Philadelphia, Pa., having petitioned for the extension of a patent granted to him the 9th day of May, 1854, for an improvement in machinery for cutting paper, for seven years from the expiration of said patent, which takes place on the 9th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 20th day of April next.

John Myers and Robert G. Eunson, of New York city, having petitioned for the extension of a patent granted to him the 23d day of May, 1854, for an improvement in Machines for sawing thin boards, etc., for seven years from the expiration of said patent, which takes place on the 23d day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 4th day of May next.

Harriet C. B. Bigelow, administratrix of the estate of Charles H. Bigelow, deceased, of Pittsfield, Mass., having petitioned for the extension of a patent granted to the said Charles H. Bigelow the 30th day of May, 1854, for an improvement in mode of manufacturing turbine wheels, for seven years from the expiration of said patent, which takes place on the 30th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 11th day of May next.

Daniel W. Shares, of Hamden, Conn., having petitioned for the extension of a patent granted to him the 1st day of August, 1854, for an improvement in cultivators, for seven years from the expiration of said patent, which takes place on the 1st day of August, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 22d day of June next.

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Improvement in Automatic Harvesters.

The object of this invention is to automatically discharge the cut grain from the platform of a harvester in gavels ready for binding, the improvement consisting in combining an endless apron, moving intermittently, with a cut-off, which supports the falling grain while the apron is moving, and which is withdrawn when the apron stops, to permit the grain to fall upon the platform; the stoppage of the apron and the withdrawal of the cut-off being simultaneously effected by a single movement of mechanism operated by the driver.

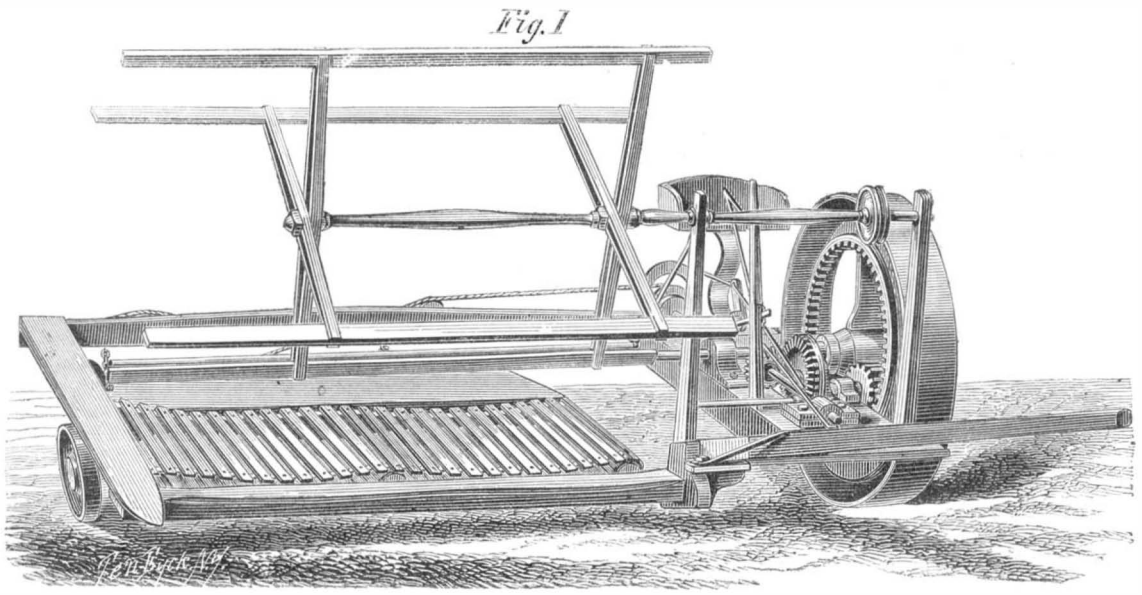
In the accompanying engravings the rectangular frame of the machine is supported on two wheels, one the main driver and the other a smaller truck wheel. The driving wheel carries, as usual, a series of internal cogs, which drive a spur or pinion turning a counter shaft, which, by two bevel gears, drives the crank shaft, giving motion to the cutters by crank and pitman in the usual way. To the front end of the finger beam is hinged a platform, its rear end suspended from the frame by chains, by which the platform may be set at any angle with the ground. Parallel with the finger bar is a slotted endless apron mounted on rollers, the shaft of one projecting beyond the rear of the frame and carrying on it a pulley or a set of pulleys, driven by a cord or band from corresponding pulleys on the crank shaft. Intermediate pulleys are mounted in adjustable bearings to keep the belt taut. This arrangement of pulleys and belt drives the endless apron, the speed of which, relative to that of the other portions of the machine, being regulated by changing the belt from one series of the pulleys to another. In order to produce an intermittent action of the endless apron the pulleys on the crank shaft are made to shift or slide engaging with a feather and clutch; a link rod attached to a foot lever adjacent to the driver's seat enabling him to control the action of the apron. A cut-off between the reel and the platform is so arranged as to vibrate between and parallel to the reel and platform, and is operated at the same time as the pulleys which drive the apron, and by similar contrivances.

The operation of the machine is as follows: the grain is swept up to the cutters by the reel, and when cut falls upon the endless apron, which is at rest, the cut-off rod being likewise withdrawn. When a gavel of sufficient size, in the judgment of the driver, has accumulated, he, with his foot, throws the pulleys into gear, starting the apron, which discharges the grain upon the ground between the driving wheel and the end of the platform and parallel to the latter. The same movement of the driver's foot which starts the apron, also interposes the cut-off, or receiving rod, between the reel and platform to retain and hold the grain from contact with the apron, while the latter is in motion. When the gavel is delivered the driver again throws the apron pulley out of gear, the apron becomes stationary, the cut-off is again withdrawn, and the process of receiving and discharging repeated.

In a test trial between nine different machines made October 27, 1867, in Huron, Canada, this machine received the first prize, showing, among its other advantages, much less draft, by the dynamometer, than the smallest and lightest machine on the ground.

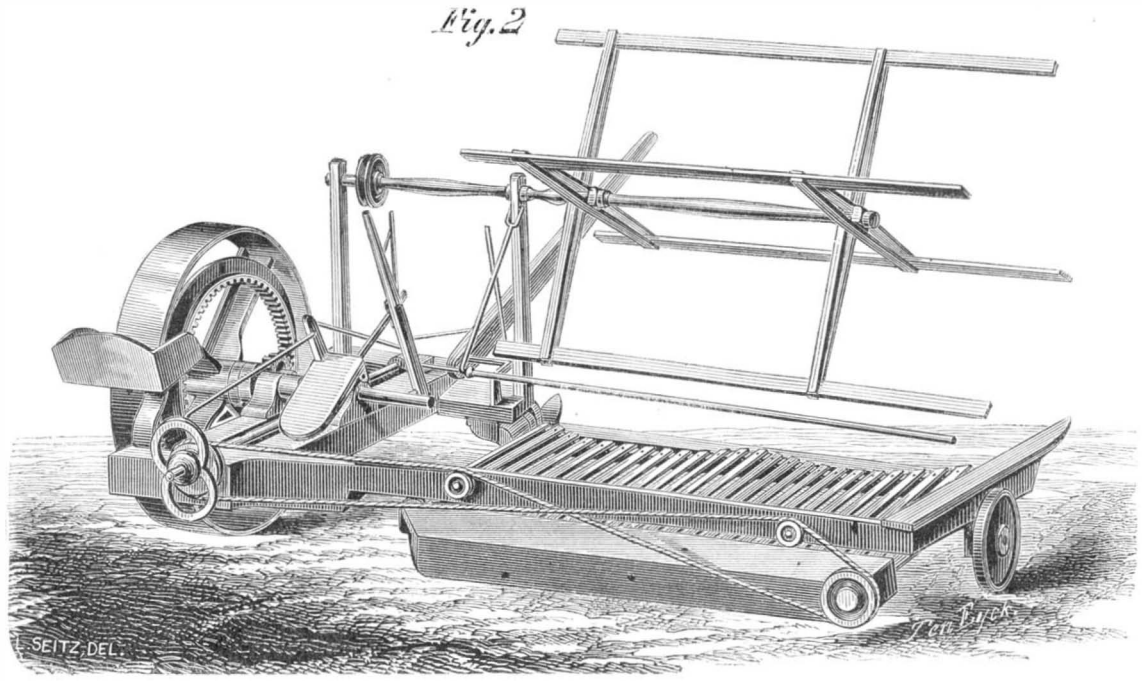
It was patented by James Collins, of Guelph, Canada, Feb. 19, 1867. All communications relative to rights and royalties should be addressed by B. G. Harris, No. 26 Commerce street, Baltimore, Md.

Fig. 1



COLLINS' PATENT GRAIN HARVESTER.

Fig. 2



The Preservation of Leather.

A contributor to the *Shoe and Leather Reporter* gives some valuable hints in relation to the preservation of leather. The extreme heat to which most men and women expose boots and shoes during winter deprives leather of its vitality, rendering it liable to break and crack. Patent leather particularly is often destroyed in this manner. When leather becomes so warm as to give off the smell of leather, it is singed. Next to the singeing caused by fire heat, is the heat and dampness caused by the covering of rubber. Close rubber shoes destroy the life of leather.

The practice of washing harness in warm water and with soap is very damaging. If a coat of oil is put on immediately after washing, the damage is repaired. No harness is ever so soiled that a damp sponge will not remove the dirt; but, even when the sponge is applied, it is always useful to add a slight coat of oil by the use of another sponge.

All varnishes and all blacking containing the properties of varnish should be avoided. Ignorant and indolent hostlers are apt to use such substances on their harness as will give the most immediate effect, and these, as a general thing are most destructive to the leather.

When harness loses its luster and turns brown, which almost any leather will do after long exposure to the air, the harness should be given a new coat of grain black. Before using this grain black, the grain surface should be thoroughly washed with potash water until all the grease is killed, and after the application of the grain black, oil and tallow should be applied to the surface. This will not only "fasten the color," but make the leather flexible. Harness which is grained can be cleaned with kerosene or spirits of turpentine, and no harm will result if the parts affected are washed and oiled immediately afterward.

Shoe leather is generally abused. Persons know nothing or care less about the kind of material used than they do about the polish produced. Vitriol blacking is used until every particle of the oil in the leather is destroyed. To remedy this abuse the leather should be washed once a month with warm water, and when about half dry, a coat of oil and tallow should be applied, and the boots set aside for a day or two. This will renew the elasticity and life in the leather, and when thus used upper leather will seldom crack or break.

Band leather is not generally properly used. When oil is applied to belting dry it does not spread uniformly, and does not incorporate itself with the fiber as when partly dampened with water. The best way to oil a belt is to take it from the pulleys and immerse it in a warm solution of tallow and oil. After allowing it to remain a few moments the belt should be immersed in water heated to one hundred degrees, and instantly removed. This will drive the oil and tallow all in, and at the same time properly temper the leather.

Zig-zag Veneers.

A recent patent to Jno. B. Wilson, of New York city, is as follows:

"Previous to my invention it has been customary, in the cutting of veneers, to cut the log with a straight knife, in the direction of its length, so that the veneers would present little or no 'figure.' My invention consists in a veneer formed by cutting off a waved, crimped, or corrugated slab or stratum from the log, in such manner that the cut surface shall present the different shades of the grains, as cut at different angles alternately, in lieu of only the grain cut in one straight line from end to end, as heretofore. I propose generally, in the use of my improved veneers, to press them out flat, to apply to plane surfaces, but they may be made, adapted, and applied to corrugated or other-formed surfaces, with perfect facility, as will be understood by those familiar with the manufacture and use of veneers."

Surgical Pneumatics.

Dr. Maisonneuve, surgeon of the Hôtél Dieu, has communicated to the Academy of Sciences a paper on the advantages of a continuous aspiration in the healing of great amputations. He asserts that the liquids exuding from the surface of a fresh wound become morbid, in contact with the external air, and poisonous putrefaction at once ensues, and this is the principal cause of danger in surgical operations. The author was led to believe that if the liquid at the surface of the wound could be hindered from putrefying, that amputation, etc., could always be performed with safety to the life of the patient.

In carrying out this suggestion of Dr. Maisonneuve, an apparatus contrived by Dr. Guerin, was exhibited and explained at the same meeting of the Academy. It consists of a hemispherical balloon provided with three tubulatures, the central and largest one being fitted with a manometer of very simple construction, a graduated glass tube terminated by an india-rubber ball filled with mercury. The ball is inclosed in the balloon, so that in proportion to the vacuum effected in the latter the former is dilated, in consequence of which the mercury in the tube falls, a scale showing the amount of fall, and hence also the degree of rarefaction in the balloon. The second tubulature receives a tube communicating with the receiver of an air-pump, and by the third, communication is effected between the balloon and each patient or hospital bed by means of india-rubber tubes, so that "pneumatic occulsion," as it is called, may be extended simultaneously to all the patients confined in the same surgical ward. There are stop cocks for regulating the degree of vacuum in the central vessel, and the part under treatment is covered with a sort of india-rubber hood which effectually protects it in each case from the action of the external air. The inventor is convinced that by his method the expense of hospital dressings and the dangers of operations will both be much diminished.

Specific Gravity.

The weight of an equal bulk of different substances varies very much as every one knows. The plan has been adopted to compare them all with water, and the number representing how many times a body is heavier than water is called the specific gravity of that body. So as gold is 19 and silver 10 times heavier than water, those numbers 19 and 10 are said to represent the specific gravity of gold and silver. The heaviest of all known subtances is the very hard metal used for making points to the so-called diamond gold pens. It is called irridium; its specific gravity is 23. Next comes platinum, 21: gold, 19; mercury, 13·5; lead, 11·3; silver, 10; copper, 8; iron, 7; zinc, 6; different kinds of stones, from 4 to 1; aluminum, 2·5. Flax and all woody fibers have a specific gravity of 1·4 and are thus heavier than water, but wood will float or sink according to the number of its pores into which the water does not penetrate. So ebony and many kinds of hard wood sink, pine and all kinds of soft wood float. Cork is the lightest wood, its specific gravity being only 0·24, less than one quarter that of water. Alcohol is about three quarters the weight of water, and as the strength of liquor depends on the amount of alcohol it contains this strength is simply found out by its specific gravity indicated by the more or less floating of a little instrument called a hydrometer, the weaker liquid being little lighter than water has the strongest buoyant power; solutions of different salts, sugar, etc., being heavier than water, have a stronger bouyant power, and therefore vessels will sink less in the sea than in fresh water, and it is more difficult to swim in the latter than in the sea. The lightest of all liquids has a specific gravity of 0·6; it is called chimogene and is made from petroleum; it is exceedingly volatile and combustible; in fact, it is a liquefied gas. Carbonic acid gas or choke damp is about 500 times lighter than water; common air, 800; street gas about 2,000, and pure hydrogen, the lightest of all substances, 12,000 times. The heaviest substance has thus 23 × 12,000 or more than a quarter of a million times more weight than an equal bulk of the lightest; and the substance of which comets are made, has by astronomers been proved to be even several thousand times lighter than hydrogen gas.

AN exchange suggests that stoves on railroad cars should have a water reservoir underneath, so that if the car is overturned the water will be turned on the fire to extinguish it.

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NEW YORK, SATURDAY, FEBRUARY 15, 1868.

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MERETRICIOUS ORNAMENTATION OF MACHINERY VS. FINISH OF WORKING PARTS.

Considerable emotion has been manifested on the route of the New York Central Railroad, lately, in regard to the action of the recently elected President of the Company, Commodore Vanderbilt, in prohibiting the expenditure of time, labor, and money in the useless ornamentation of the locomotives run on that road. Being eminently practical he believes in sacrificing beauty to utility, appearances to efficiency. It is possible that the stir to which we refer is unnecessary and without adequate cause. To be sure, any machine may be made beautiful—agreeable and attractive to the eye—without impairing the efficiency of its action; but that efficiency may be secured with much less cost if the question of appearance should be left altogether out of the question.

It is undeniable that the most correct characteristic of beauty is the adaptation of the machine to the work to be performed, considered with reference to the circumstances under which the work is to be done. While we could expect no particular elegance of form or beauty of decoration either in a *Dunderberg* or a *Monitor*, or in a fifteen or twenty inch gun, we should look for both in a sewing machine. The one is intended for hard knocks, the batterings and hammerings of the elements and man's most destructive agents; the other subserves the comforts and enhances the elegancies of life. Still, a machine intended for the heaviest and roughest work, need not necessarily be uncouth, disproportioned, and ugly. It may present agreeableness of form and harmoniousness of parts without imparing its efficiency and be a pleasure to the eye of taste, even without the aid of useless ornament.

Evidently the primary object of a machine is to do the work expected from it effectually and economically. To this end proportion and fitness of parts, fine joints, fidelity of construction, and general good workmanship are necessary. These secured, the machine itself is completed. Whatever else of labor or time is added improves only the outward appearance of the machine without at all adding to its value for practical use. Yet it is safe to say that a large proportion of the work and time expended on machinery generally, is wasted in the effort to beautify without otherwise improving it. A few years ago we saw a set of machines for stocking guns, sent from a firm celebrated for producing highly finished as well as perfect work. Every portion of the machines was finished—not painted, nor only emery ground—but hand finished; the standards and frames as nicely polished as any of the working parts. This enhanced greatly the cost, and added to the attractiveness, but did not increase the working value of the tools. There can be no question, that the labor expended on this unnecessary finish was really wasted. This finicalness in machine manufacture is not to be desired.

There is no known method of finishing irregular forms by machinery; it must be done mostly by hand, which is costly, on account of the time required. It would seem to be the part of prudence to avoid this needless outlay, and divert the patient manipulation thus wasted to a perfection of the working parts. No intelligent and judicious manufacturer can object to the expenditure of time necessary to produce a perfect joint between working parts, as a valve and its seat, a journal and its box, etc.; but here the use of the scraper, the emery stick, the oil stone, and other similar appliances, might be measurably restricted, so far, at least, as most heavy machinery is concerned. Fancy tools, which are designed to be ornaments as well as useful appliances, need not be reckoned in this category.

Elegance of form and proportion of parts can be obtained with no additional cost over clumsiness and unfitness; it is just as easy to cast from a graceful pattern as from a combination of straight sticks. Paint and varnish, judiciously employed, will hide unsightliness of color and bring out the inherent beauties of form, while they will prevent oxidation, and save many hours of needless labor otherwise wasted in frequent cleaning. The mechanic can show his educated judgment in attention to these details, and in the avoidance of a waste of time, as well as in studious attention to perfection of parts and ease of working.

To this strictly utilitarian view, however, we do not wholly subscribe. Whenever and wherever the purchaser of a machine or tool desires the expenditure of the necessary labor, at a proper compensation, to make his machine a "thing of beauty," he provides a gratification not only for himself, but for others, which is truly commendable. The engineer and fireman of a locomotive will take more pride in a machine the finish and ornamentation of which attracts the attention and excites the admiration of others, than in a black, dingy, repulsive monster, whose only excellence is its power. Every piece of shining brass, polished iron or steel, or brilliant silver plate, becomes an object of care, attention, and solicitude, employing the time and attention which might otherwise be diverted to far less worthy objects. There is such a thing as esthetics in machinery, and our mechanics can justly lay claim to a large share of taste. It is sufficiently evinced in their laying out and contriving of tools, their combination of practical effect with pleasing appearances, and their delicacy of the finish of ornamental parts. This taste should be studied by managers, especially when its indulgence will not entail a heavy additional cost. The operator of a machine, taking the locomotive engineer as an example, becomes attached to the insensate mechanism he controls, and gradually makes it, or its welfare, a part of himself. He feels a pride in its action and in its appearance; but if that appearance is repulsive, he cannot long hold his rebellious tastes in control to his sense of duty, and the machine which should have been his pride becomes a source of annoyance.

These considerations should, we think, have some effect on our master mechanics and railroad managers. Give the operative mechanic a reason for a feeling of pride not only in the performance but the appearance of his machine, and his value as a workman or operative, as well as that of the machine, will be enhanced, while his own tastes and aspirations may be educated and elevated.

COMMISSIONER OF PATENTS' REPORT.

On another page may be found the annual report of the Patent Office for the year 1867. Persons versed in mechanical matters will be interested in examining the statistical portion of the report, which exhibits such a remarkable increase in the number of patents issued from year to year. The submitting of this report was about the last act of Commissioner Theaker before retiring from the Patent Office, and is a document very creditable to its compiler, being short and still comprehensive enough to contain everything of interest or importance to the public.

The financial condition of the Patent Office is most satisfactory, the surplus funds after paying the expenses continually augment. As in years past, the Commissioner shows the necessity for more room and justly pleads to Congress for relief in this respect. We hope the pressing necessities of the Office for additional space will be appreciated by Congress and that another session may not close without providing some remedy for the over-crowded state of the Office.

We observe that the report states, on the authority of the examiners, that the business of the Office is up to date. This is undoubtedly correct as applied to nearly all the classes, but there are a few out of the thirty-six which, to our certain knowledge, are not up with their work to within two or three months.

The present force is no doubt adequate to keep the work promptly up, and, if ample room can be provided, the business of the Office will be greatly facilitated.

IMPORTANCE OF A COMMISSIONER.

We notice, among a large number of names sent by the President to the Senate for confirmation, that of W. D. Bishop, of Bridgeport, Conn., for Commissioner of Patents. Mr. Bishop filled the office acceptably about the year 1860, and, if he is confirmed and accepts the appointment, he will give satisfaction to all having business with his department. Mr. Bishop is by nature and taste a mechanic, by profession a lawyer, and at present he occupies the important positions of President of the Naugatuck and New York and New Haven Railroads.

It is very important that the place made vacant by the resignation of Mr. Theaker, be filled without delay; and it is equally important that the office be filled by a competent person. Intricate questions arise every day, which require prompt and correct decisions; and, that uniformity of policy may exist throughout the office, it is important that it should not remain without an executive head longer than necessary.

Cases of extensions and reissue of vast importance to the patentees are coming up constantly for adjudication, and it is important in many cases, and desirable in all, that the Commissioner should review the decisions made by the examiners before they receive the official seal.

The office should be filled by a man of integrity, ability and executive force. Give us a Commissioner, possessing these qualifications, and that right early.

Patent Office Illustrations.

To Messrs. E. K. Jewett & Co., Buffalo, N. Y., we are indebted for another installment of their most excellent illustrations, prepared for the Patent Office Reports for 1866. The execution of these engravings is superbly done, and it is a pity their beauty should be spoiled by being printed on a Government press.

Singular Explosion.--Sorghum Separator Blown Up.

We copy the following account of an extraordinary occurrence from the *Prairie Telegraph*, Rensselaer, Ind., of Jan. 23, 1868:

We learn that quite a singular accident occurred at the residence of Mr. F. W. Bedford, half a mile east of town. Mr. Bedford has on exhibition a patent sorghum sugar separater, which is said to make 2,000 revolutions per minute, separating the sugar from the molasses through a screen by centrifugal force. One day, the first of the week, two or three gentlemen took some granulated sorghum and went out there to experiment with it; not finding Mr. Bedford at home they undertook to "run the machine" themselves, poured in the molasses cold, without thinning, and very fast, all the while working the machine to its utmost capacity. Becoming delighted with its working, they tried to put on more power when it burst with a noise like the explosion of a sixty-four pounder shell, and one of the fragments striking one of the experimenters, Mr. M. V. B. Warner, on the back of the head knocked him down; he was taken up senseless and brought to his home in town, but is now able to be about.

The question arises, what was the cause of the explosion? The machine is conical in form, ten inches in diameter at the top and some sixteen at the bottom: it is composed of thick Russia sheet-iron bound with two hoops of wrought iron three eighths of an inch thick by two and a half to three inches wide; inside of this is a conical-shaped sheet of perforated brass near a quarter of an inch in thickness, and working within this is an upright iron shaft with a cast-iron circular plate about half an inch thick and seven inches in diameter attached near the top. The explosion of the sorghum burst the circular cast-iron plate, the perforated brass cone, the sheet-iron casing and both of its wrought-iron bands, making a complete wreck of the machine, and scattering the fragments in every direction. After Mr. Warner recovered from the effects of the blow, he discovered that his clothing was thickly spattered over with a kind of black gummy soot, in appearance very much like burnt sugar. Was the explosion caused by the friction of the machinery and granules of sugar eliminating and igniting a latent and highly explosive gas contained in sorghum sugar? The effect of the explosion indicates a force but slightly inferior to gunpowder.

It seems to us that this explosion or bursting was the result of centrifugal force, as in the case of a grindstone driven at too high a velocity.

Sugar, when heated somewhat above 420°, yields combustible gases, with carbonic acid, empyreumatic oil, and acetic acid. A portion—about one-fourth in weight—is charcoal, so pure as to burn without residue. If the sugar had been confined, as in a retort, it would not be impossible that sufficient heat might be generated by friction due to the rapid motion of the machine to thus decompose the sugar and cause explosion. But, as we understand it, the cylinder containing the sugar was open to the air; consequently there was no confinement and apparently no sufficient conditions for gaseous explosion.

TURNING A MOVABLE WHEEL AROUND A FIXED WHEEL.

In continuing this subject it will be proper to refer again to the original question which gave rise to the discussion. The original inquiry, published on page 347 of Vol. XVI., was: "How many revolutions on its own axis will a wheel make in rolling once around a fixed wheel of the same size?" Our answer was, "One." Another correspondent, page 39, Vol. XVII., stated that we were wrong, and that "two" was the proper reply. We made some remarks in connection with the matter, but adhered to "one revolution" as correct."

On page 67 of the present volume, L. M. renews the subject and presents a diagram and postulate to demonstrate that we are wrong, and states that "the number of revolutions, on its own axis, that a wheel will make in rolling around a fixed wheel of the same size is two. "Don't you think so?" We replied that we did not think so, and that we still adhered to "one."

L. M.'s diagram seems to have created much interest in the subject, and since its publication we have received probably half a bushel of letters from correspondents, most of whom adopt L. M.'s theory, and insist that the rolling wheel makes two revolutions on its axis.

We shall make selections from some of these communications, and would gladly publish them all, but the number is too great and our space limited. We trust that no one will feel hurt by the omission of his letters. We will begin with "L. M.," who again writes as follows:

DEAR EDITORS:—Under the pressure of the multifarious exigencies of such an editorship as yours, you cannot afford to give much time or thought to those merely curious questions that seem to have little or no reference to your leading purpose—the utilization of scientific truths. The question at issue is probably ranked by you in the class of idle speculations. But it seems to me that every fact developed by the operations of various combinations of mechanical agencies, although at present of no apparent value, may, in the course of the rapid increase of mechanical devices, find in some of them a fitting place, where a knowledge of such fact might facilitate, or even be essential to the perfecting of the device.

It is manifest that your judgment, appended to my article on page 67, Vol. XVIII., was derived from a very hasty glance at my diagram, without giving any heed to my postulate or to my remarks on its application; for you ignore them all. I therefore beg to recall your attention to that postulate, which is in these words:

'Two diametrically opposite points on the periphery of a wheel cannot exchange places without half a revolution of the wheel.'

This is self-evident, and you will not controvert it. But your assent to it will settle the question; for the diagram shows to the eye, in a manner admitting of no misconception, that in rolling once around the fixed wheel the opposite points on the periphery of the free wheel have exchanged places four times, each exchange involving half a revolution of the

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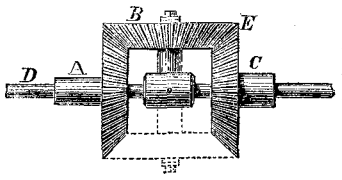
wheel. Therefore, as *two* is the sum of *four halves*, it follows that "the number of revolutions on its own axis that a wheel will make in rolling *once* around a fixed wheel of the same size is *two*. L. M.

Germantown, Phila.

We would say that we do not object to L. M.'s postulate nor ignore his remarks. He has a right to choose his own method of demonstrating the correctness of his conclusion. This he does by assuming that "Two diametrically opposite points on the periphery of a wheel cannot exchange places without a half revolution of the wheel. Therefore, as two is is the sum of four halves, it follows," etc.

We do not think it needful to discuss the correctness of L. M.'s postulate, because to do so would be to switch off on to another subject. The question under discussion is, "How many times does a wheel turn on its own axis in rolling around another wheel of the same diameter?" The subject of exchange of places of diametrically opposite points, as proposed by L. M., is still another question.

Messrs. Editors:—I have taken the "Scientific" all the time since 1850, except what time I served Uncle Sam in the little "onpleasantness," and I have always put faith in your decisions, but now I think you have made a mistake, Vol. XVIII., No. 5, page 67, in saying, "We still adhere to one." Look at my diagram and see if you are not wrong.



Let the annexed represent what is known as a "compound" composed of three miter gears, such as are used in cotton speeders and fly frames. The gears, A and C, run loose on the shaft, D, the gear, B, runs on a stud fastened at right angles to shaft, D. Now if you turn one of these gears a revolution the other two will each make one revolution, but if you hold one fast, say A, and turn the shaft, D, once round, so as to carry the gear, A, once round A, the gear, C, will make two complete revolutions. Taking the diagram, if you mark a tooth at E, on the gear, C, and turn the shaft, D, until B is in the position of the dotted lines, the tooth, E, will be at the top, having made one revolution. I think you will now acknowledge that it is "two," and not "one." If you "don't see it," you can convince yourself, if you will take the trouble to get three miter gears and try it.

Any man who has worked in a cotton mill and knows the principle on which the speeder works, knows that a wheel revolving round one of the same size will make two revolutions round its own axis. I write this simply to correct your error, for having such faith in the "Scientific," I don't wish to see any mistakes uncorrected. J. H. Glover.

We don't see it. We still adhere to "one."

W. E. H. belongs to the "two" revolution philosophers, and says: "As seeing is believing, I send herewith a model designed to illustrate the question." We have received the model, which is quite neat, and clearly shows that the loose wheel turns only once on its axis in passing once around the fixed wheel. We are having the model engraved, and the diagram will appear next week. Will W. E. H. please send his explanation again? We have mislaid his letter.

Messrs. Editors:—I think your correspondent L. M. has rather the best of the argument in regard to the wheel revolving around one of its own size. You must certainly see that if your starting point, *a*, which is on the right hand side of the movable wheel, comes on the right hand side of the same wheel, it has made one revolution on its axis as certainly as the earth makes one revolution every time you see the sun in the east. It is not necessary that the same points should come together to produce one turn on its own axis.

Tom Brown, Foreman Buckeye Works.

Poughkeepsie, N. Y.

Messrs Editors:—Your correspondent L. M., Vol. XVIII., No. 5, page 67, gives you a diagram by which he proves himself correct, that a wheel rolled around a fixed wheel of the same size makes two revolutions around its own axis. You say by his diagram he proves himself wrong, and you give *a a* as the true starting point. It makes no difference what starting point you have, the result is the same. I have tried the experiment, to the satisfaction of all who have seen me roll the wheel around a fixed wheel of the same size. I believe I can convince any one by showing them the operation.

If you will look at the diagram you will see that your starting point, *a*, is on the right hand side of the center of the wheel before it is moved. When it is rolled to B, you see it stands on the left of its own center, showing one half revolution, and when rolled to C, your *a* stands again on the right, just as it stood before being moved, proving positively that it has made one revolution around its own axis. Rolling on to the place of beginning will duplicate the above result, proving I think beyond a doubt that a wheel rolled around a fixed wheel of the same size will make two revolutions around its own axis.

Are you now convinced or do you still adhere to "one?"

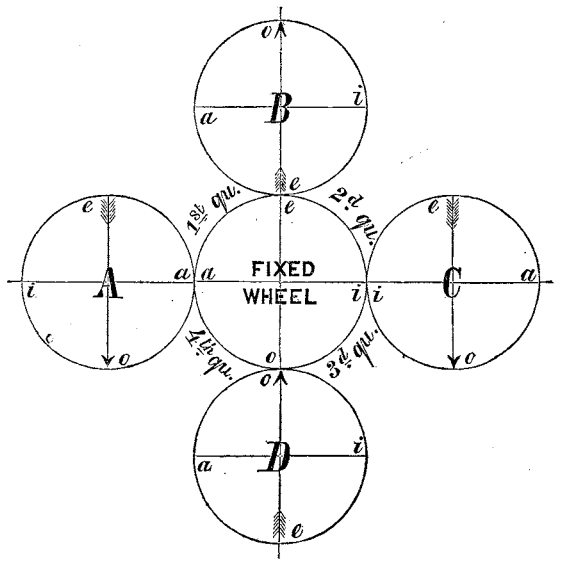
Tarrytown, N. Y. C. D. S.

You are wrong. We adhere to "one."

Messrs. Editors: I hope that you will excuse anything that may seem wrong or too officious on my part in this note. It is true I have no business with the point in dispute, but my anxiety and ambition for the success, worldwidely, of the Scientific American, and for the scientific renown of its editors, is such I cannot refrain from thus addressing them.

The diagram I give is copied from that of L. M., page 67, Vol. 17; it is therefore substantially the same; like letters representing like points, etc., and the only true way to read that diagram, in my opinion is to observe the points of direction in which the arrow or any one of the letters lie in, as the moving wheel reaches the successive quadratural points upon the fixed wheel. If we look only to the relative letters of the movable wheel as related to those of the fixed and central wheel, we shall be deluded and deceived, as sure as light shines; for *a e i o* in the moving wheel will run into *a e i o* in the fixed wheel forever and forever (as the saying is), but if we want to master the difficulty, and arrive at a true and absolutely certain solution of the point in question; we must at once look away from the central wheel, and their relative points upon the moving or outside wheel; and strike right into the point of inquiry which asks, "In what direction does any one point upon the periphery of the moving wheel lie when that wheel reaches the successive quadratural points of the fixed wheel.?

If we lay the diagram down upon the table in such a position that A will be west, B north, C east, and D south, then we can not fail to arrive at the true solution of the problem.



We will now start at A; *i* in the moving wheel is now west; arriving at B, *i* will then be east. Passing on to C, *i* will then be west again, exactly in the same direction in which it was before starting. This is one full rotation gained or made by outside wheel, while it has only reached a point one half round the circumference of fixed wheel. When it reaches its position at D, then *i* will be east again, the same as it was when the wheel was at B, thus a rotation and a half has been made, and when the wheel finally reaches its position at A again, the point from whence it started, *i* will again be west, as it was at first, and therefore a revolving wheel makes two rotations on its own axis for every time it revolves around a fixed wheel.

I hope that this will be sufficiently plain to satisfy Eds. that there are *two* revolutions or rotations instead of one, as they say. If it is not satisfactory, I hope they will overlook my officious anxiety, as it is for Eds'. sakes that I thus write.

Gloucester, N. J. John Hepburn, Sr.

We feel obliged to Professor Hepburn for the kind feeling which prompts him to attempt to relieve us from what he supposes to be an error. The author of the great Hepburn theory of Recession will be a powerful aid to L. M., and his many supporters. But we still adhere to "one."

Messrs. Editors:—You and your correspondent, L. M., are both to a certain extent right.

Suppose a blacksmith wishes to take the size of a wagon wheel for the purpose of making a tire; he walks around the wheel, applying his "traveler" to its circumference and notes, say, six revolutions, but in walking around the wheel he turns his body once round. This is your case. In place of this, should he stand still, keeping the handle of "the travelers" always in one direction, say North and South, and so run it round the wheel, his chalk mark would pass the handle seven times. This is L. M's case.

In fact, this case is analagous to the revolution of the earth around the sun, when we have 366 sidereal against 365 solar days. M. B.

New Jersey.

Ice-House Knaves.

We are in receipt of letters from correspondents, in various parts of the country, stating that persons traveling in the guise of agents are demanding, of farmers and others, having ice-houses, payments for a pretended infringement of a patent. The alleged infringement consists in having a hole, or any other sort of ventilator, made in the ice-house. We are informed that thousands of dollars have been collected by this impudent system of swindling. If the Scientific American were read in every family, as it ought to be, it would be unnecessary to warn the public against such miserable deceptions. No valid patent can now exist upon the idea of ventilating ice houses. It was in common use before our patent laws were created. A good article upon ice-houses, in which the proper method of ventilation is described, will be found on page 144, Vol. II., of the Scientific American, January 30, 1847—twenty-one years ago. Other back numbers contain several articles upon the subject.

Remarkable Tenuity of Gold Leaf.

Probably one can get as good an idea of the surprising tenuity of the gold leaf ordinarily used in gilding from a consideration of its price as compared with its amount in square inches as by any other illustration. A "book" of twenty-six leaves, each four inches square, composed of gold of twenty-three carats purity, is sold, at retail, even in these times of a depreciated currency for fifty cents! Four hundred and sixteen square inches of pure gold for a fifty-cent scrip!

SHIPS' PUMPS DONE AWAY WITH.

Some of our Canadian papers and friends are excited over an alleged new invention, and, as they think, remarkable for removing water from vessels without a pump. A device was lately tried at Montreal, in a small boat, the ice on the river having been previously cut away. The result is not given. The invention consists in having a pipe projected through the bottom of the vessel, the pipe having an aperture which opens towards the stern. The idea is that the forward movement of the boat will produce suction through the pipe, and thereby draw out any water that may be contained in the vessel. E. P. Jay is the fortunate Canadian who is awarded as the discoverer of this improvement, and it is stated in the Montreal paper that he has obtained letters patent in the United States and other countries. But we observe no patent granted to him as yet in this country. The idea of the device is not new. It was described in the Scientific American, page 185, of our paper, Vol. 16, March 13, 1867; and on page 72 of the same volume is an engraving thereof. Letters patent of the United States were granted for the invention to Moses F. Bagley, Alton, Ill., Oct. 30, 1866.

A Near View of Flowing Lava.

Bayard Taylor, the celebrated traveler and writer was present on Mt. Vesuvius during its recent eruption, and describes the appearance of the moving lava as follows:—

"There appeared to be two streams, both moving in the same manner—that is, only partially flowing on the surface of the old lava, but burrowing under its loose crust, splitting and upheaving it, and mixing its materials with the new mass. The noise of the flow was thus produced. The fire was silent and irresistible; there was no hiss or spluttering of the molten elements, but the stream lifted and threw off solid masses, even tuns in weight, without the least apparent force or check.

"I had always imagined a thick, sluggish stream, with a tolerably smooth surface, something like the flow from a smelting furnace—but here were moving mounds, rough and shapeless, the chief power of which lay in their bases, hidden from sight—strange creeping, mining forces, moving forward with a horrible, pitiless certanty in their locomotion. If the scene was less grand in its features than one would expect, it was at least diabollically impressive. It expressed only destruction, and of the most cold-blooded, deliberate kind. The main stream had raised a long ridge, some twenty feet in hight, apparently cold on the surface, until some squirming movement in advance shook off the crust in scales, and showed fangs and throats of intensest fire. The front of this ridge was constantly hurling huge masses, some of them red-hot, down the gorge. The nearer stream was not more than four feet in hight, and allowed us to approach near enough to poke its glowing sides with a stick. All along its edge boys were busy roasting eggs for travelers, or imbedding coins in the fluid lava, which they snatched out of the mass and twisted off, very much as I have seen children manage molasses candy. The heat, even at a hundred yards distance, was uncomfortable, and I could not stand beside the moving lava for more than a few seconds at a time."

Business Shrewdness.

"A New England manufacturer performed a shrewd trick. The chief market for his wares has been found for many years in Boston, but early in the spring his customers notified him that their stock was full, and that they required no more till next year. This was very unpleasant news; the factory was in danger of stopping if no more orders came. Thereupon, without delay, the manufacturer went to New York, got an order for five thousand dollars' worth of goods from one of the heavy wholesale dry goods houses, went home, and started his factory to fill the contract. The Boston houses were immediately notified that he had received a large order from New York. 'Bless us!' they said, 'business must be coming up—make us five thousand dollars' worth.' The maker began work upon contract No. 2, and two days afterward the New York house sent another order, which was also duplicated by the Boston dealers. At last accounts, the factory, just out of Boston, was spinning merrily, and the owner was a proud and happy man."

We copy the above from an English paper. The dodge accredited to New England was probably never heard of down there; but knowing that the manufacturers of Massachusetts, as well as other States, are anxious to adopt every honorable strategy to sell their goods, we publish this for their benefit.

Aluminum.

F. W. Gerhard obtained a patent in 1856, in England, for an "improved means of obtaining aluminum metal and the adaptation thereof to the manufacture of certain useful articles." Powdered fluoride of aluminum is placed alone or in combination with other fluorides in a closed furnace, heated to a red heat and exposed to the action of hydrogen gas which is used as a reagent in the place of sodium. A reverberatory furnace is used by preference. The fluoride of aluminum is placed in shallow trays or dishes, each dish being surrounded by clean iron filings placed in suitable receptacles; dry hydrogen gas is forced in and suitable entry and exit pipes and stopcocks are provided. The hydrogen gas combining with the fluorine "forms hydro-fluoric acid, which is taken up by the iron and is thereby converted into fluoride of iron." The resulting aluminum "remains in a metallic state in the bottom of the trays containing the fluoride," and may be used for a variety of manufacturing and ornamental purposes.

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OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING JANUARY 28, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat.....$10
On filing each application for a Patent, except for a design.....$15
On issuing each original Patent.....$20
On appeal to Commissioner of Patents.....$20
On application for Reissue.....$30
On application for Extension of Patent.....$50
On granting the Extension.....$50
On filing a Disclaimer.....$10
On filing application for Design (three and a half years).....$10
On filing application for Design (seven years).....$15
On filing application for Design (fourteen years).....$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

73,687.—CONSTRUCTION OF MILK CAN.—Estes Abbott, Willoughby, Ohio.

I claim a new and improved milk can, as described, constructed in the manner substantially as herein set forth.

73,688.—WELL TUBE.—Hiram Arnold, Gowanda, N. Y.

I claim the combination of the interposed shoulder, f, of the driving point, C, and the interposed section of tubing, i, with the external tube, H H', and internal tube, A, said interposed portions being of a different material, for the purpose of relieving the parts in contact from the injurious effect of the concussion in driving, constructed and arranged substantially as set forth.

73,689.—MANUFACTURE OF SODA AND SULPHURIC ACID.—Haydn M. Baker, Rochester, N. Y., assignor to himself and H. French, Springfield, Mass.

I claim, 1st, The recovery of the sulphuric acid from salt cake, by the use of silicic acid, with or without charcoal, in the manner herein described, or any other process substantially the same.

2d, The decomposition of the silicate of soda with quicklime, in the manner herein described, or any other manner, substantially the same, and which produces the same intended results.

73,690.—CAR SPRING.—E. U. Benedict, Chicago, Ill.

I claim, 1st, A spring so applied between the bearings that the weight of a light load is sustained about midway of the length of the spring, the manner of application being also such that the resisting power of the spring is proportionately increased according to the increase of the weight to be sustained, all substantially as herein described.

2d, The upper bearing block, or blocks, so constructed and applied upon a spring that the weight of a light load is sustained at the middle of the length of the spring, and the weight of a heavier load transferred nearer the ends of the spring, substantially as described.

73,691.—FRUIT DRYING APPARATUS.—D. K. Boswell, Columbus, Ohio.

I claim, 1st, The herein described dryer, when constructed in sections, so that it can be taken apart and put together, in the manner and for the purpose substantially as set forth.

5d, The top, B', when constructed so as to form an air chamber, H, provided with ventilations, I, dampers, F, in combination with the walls of the dryer, for the purpose and in the manner substantially as described.

3d, The flue, L, jacket, I', as arranged in combination with the chamber, H, in the manner as and for the purpose set forth.

73,692.—FRYING RACK.—Frederic Bucknam, Portland, Me.

Antedated Jan. 11, 1868.

I claim the reversible frying rack, subscantially as herein set forth and described.

73,693.—MACHINE FOR MOLDING PAPER COLLARS.—George W. Cilley and George H. Spaulding (assignors to the Norwich Paper Collar Company), Norwich, Conn., assignors to American Molded Collar Company.

We claim, 1st, The two flexible clamping plates or formers, A B, in combination with eccentrics, h, and handles, i, for closing and bending the same, substantially as and for the purpose specified.

2d, The cams or eccentrics, h, handles, i, hinge straps, t, and bars, g, in combination with the clamping plates, A B, springs, m, and supporting piece, n, substantially as and for the purpose specified.

73,694.—COMPOSITION OF MATTER.—George F. J. Colburn, Newark, N. J.

I claim, 1st, Doing away with the frangibility of gum shellac by means of asbestos, as specified.

2d, Also increasing the strength and tenacity of shellac, in the manner described.

3d, Also rendering the shellac less liable to the action of heat by the incorporation with it of asbestos in the manner specified.

4th, Also the compound, substantially as and for the purpose named.

73,965.—RAG CUTTING MACHINE.—John Collins, Jr., and Nicholas R. Nixon, Richmond, Ind., assignors to N. R. Nixon, Thomas Nixon and Allen T. Bennett.

We claim the combination of the knives, n n n, arranged upon the shaft, c, with the guard plate, A, all constructed and operating substantially as and for the purposes described.

73,696.—SEWING MACHINE.—Emil Cornely, Washington, D.C.

I claim, 1st, The combination, with the revolving looper, constructed as described, of an auxiliary looper, under the arrangement described, whereby a Wilcox & Gibbs machine, without changing its functions as a single thread machine, may be used as a double thread machine, substantially in the manner and for the purpose described.

2d, Operating the reciprocal auxiliary looper, when combined with a rotary looper, constructed as above described, by means of a circular eccentric substantially as and for the purposes set forth.

3d, The combination of the driving mechanism of the reciprocal looper with the driving mechanism of the rotary looper, by means of a reciprocating lever, receiving its movements by means of an oblique pin on the connecting rod of the eccentric of the main shaft.

4te, In combination with the lever, N, for driving the reciprocating looper of the coupling and uncoupling device, substantially as and for the purposes described.

73,697.—KNITTING MACHINE.—Thomas Crane, Fort Atkinson, Wis.

I claim, 1st, The mechanism, substantially as described, for allowing the cam plate, by which the needles are moved, to have an oscillating motion, substantially as described.

2d, Mechanism, substantially as described, for the adjustment of the needles in front of the cam plate, H, when it is desired to throw some or all of the needles out of action, substantially as described.

3d, The attachment of the arm, J, or its equivalent, directly to an oscillating cam plate, H, which is provided with a pivot, f, about which it moves, substantially as described.

4th, The combination of an adjustable work holder, D, and an adjustable jack, substantially as described.

5th, The spool or yarn holder, F, with the tube, I, or the equivalent thereof, constructed to operate substantially as described.

6th, The bow spring, G, applied to the reciprocating perforated arm, C2, in such manner as to lift the yarn between the two passages, c d, on its way from the spool to the work, said spring being so constructed as to keep an even tension upon the yarn, with little or no friction, substantially as described.

7th, A setting-up device, S t, constructed with its hooks, t, all arranged in the direction of the length of the plate, S, as shown and described.

73,698.—SIGNAL ROPE GUIDE.—Wm. G. Creamer, Brooklyn, N. Y.

I claim the application to the roofs of railroad cars, of a pulley guide for the signalling rope, substantially as described, and for the purposes mentioned.

73,699.—SHOVEL PLOW.—Thaddeus Donely and Joseph B. Cressler, Southampton, Pa.

We claim, 1st, The combination of lever, L, with subordinate levers, l l, and their attachments, pawls and springs, when operating upon the sleeves, S S, substantially as described.

2d, The combination of lever, L, with sleeves, S S, and shaft, s1, to move laterally, as substantially described.

3d, The arrangement of levers, T2 T1 and t, in connection with the tongue, substantially as described.

4th, The use of a central plow, F, detachably arranged, in connection with the side plow, substantially as described.

5th, The combination of lever, L, and its attachments, forming a combined lever, with vertical and horizontal motions, coincident when necessary and convenient, together with the adjustable devices, T2 T1 and t, all operating together, substantially and for the purposes specified.

73,700.—RAILWAY SWITCH.—M. H. Dooly, Atlanta, Ga.

I claim the elongated crank shaft, D, connecting with the sliding bars, J and C, by the pitman, e and K, in combination with the rails, A' A" A" and B, and the target signals, whereby the switch rails and signals are shifted, simultaneously, and the ordinary "frogs" dispensed with, substantially as specified.

73,701.—WASHING MACHINE.—Ezra Philo Doty and Ellis Doty, Janesville, Wis., assignors to themselves and Wm. M. Doty, New York city.

We claim, 1st The segmental arm for carrying the washboard, the center of the curve of said arm being the pivot or axis upon which it oscillates, substantially as and for the purposes herein shown and described.

2d, The combination, with the segmental arm, of a radial arm which, while uniting the segmental arm with its pivoted point, constitutes a socket for the lever handle, substantially as and for the purposes set forth.

3d, Forming the bowed or segmental arm which carries the washboard, of angle iron, so as to reduce the size of the opening in the tub, through which the said arm plays, without detracting from the strength of the arm itself, substantially as shown and set forth.

4th, The combination, with the wash tub, of a hinged cover and spring, or its mechanical equivalent, applied to the cover hinge in the manner described, so that the cover may be readily adjusted to or removed bodily from the tub, substantially as and for the purposes shown and set forth.

5th, The combination with the legs, when united with the wash tub by a tongue and groove joint, as described, of the braces or bandles, extending between the legs, and attached to each, in the manner and for the purposes shown and set forth.

73,702.—ADJUSTABLE HOE.—Timothy Drake, Hartford, Ct.

I claim the mode of construction and arrangement of the blade, a, shank, b, shank and bead, c d', gib, e, fastening screw, f, substantially as described.

73,703.—BAKING PAN.—R. G. Elder, New York city.

I claim a baking dish, provided with a sectional or broken rim, b, under, and holes, a, at the bottom, substantially as and for the purpose described.

73,704.—GATE.—Charles H. Embree, West Dresden, N. Y.

I claim the arrangement and use of the adjustable extension stem, g, and the inclined slots, I1, with the swivelled suspension loop, C, operating in the manner and for the purpose herein set forth.

73,705.—GRATE OF COOKING STOVE.—Lewis Emmons, Hamilton, Ohio.

I claim the elevated removable fireplace for cooking stoves, constructed and used in the manner substantially as and for the purpose described.

73,706.—MATCH SAFE.—John A. Evarts (assignor to Bradley and Hubbard), West Meriden, Conn.

I claim the match safe herein described, consisting of the front and back, constructed from cast metal, and the two parts united in the manner described, as a new article of manufacture.

73,707.—GANG PLOW.—A. Farrow, Carrollton, Ill.

I claim, 1st, The combination and arrangement of the lever, C, link, c, and traction connection, b b1, herein shown and described.

2d, The lever, C1, arm, C2, sector, C3, rack, C4, and plow beam, B, when combined and operated in the manner and for the purpose herein shown and described.

73,708.—STAMP MOISTENER.—J. M. Flagg, Providence, R. I.

I claim the combination of the elastic reservoir, a, the perforated cup or top, b, the absorbent material, d, and the wire gauze support, substantially as and for the purpose specified.

73,709.—SEWING MACHINE.—E. W. French, South Scituate, Mass.

I claim the combination with a tube, a looper, and a folding mechanism, of a sewing and feeding mechanism, substantially such as described, so that the material being operated upon may be fed and sewed successively forward and backward, and around the tube, so as to connect the edges of the material, and the ends of portions of the same, all in one continuous operation, substantially as described.

73,710.—LAMP.—John A. Frey, Washington, D. C.

I claim, 1st, The water chamber making a part of the burner, provided with an oil feeding duct and a water feeding duct, with the wick tube passing through the same, and nearly or entirely surrounded by water, arranged and combined substantially as described.

2d, The deflection in the top of the cone, g, as and for the purpose set forth.

73,711.—HALTER.—Wilson Garrison and Charles H. Stevens, Syracuse, N. Y.

We claim, 1st, The metallic eye, H, constructed by two hooked plates being clamped upon each other, and upon their strap, substantially in the manner and for the purpose set forth.

2d, The method of securing the opposite parts of the metallic connections to each other, and to their straps, namely, one plate provided with pins or projections, h', and the opposite plate with corresponding holes, h, in connection with a binding screw or rivet, J, as and for the purpose set forth.

3d, The transverse rib, j, with corresponding recess in the opposite plate, at the junction of the plates, as herein shown, and for the purpose described.

4th, The combination of buckle, P1, with the double securing plate, M m, as herein shown and for the purpose described.

5th, The cross bar, r, substantially as and for the purpose set forth.

6th, In connection with the cross-bar and tongue, r R, the shoulder, s, to improve the downward bearing surface of the tongue, substantially in the manner described.

73,712.—APPARATUS FOR CHARGING WATER WITH CARBONIC ACID.—Robert Grant, Brooklyn, N. Y. Antedated Jan. 17, 1868.

I claim, 1st, The cylinder, A, regulator, C, injector, P, water tank, B, and regurgitating valves, 2 and 3, arranged and operated as described, and shown in the drawings, or otherwise modified for the purpose set forth.

2d, The continuous automatic process of compressing carbonic acid or other gases in water, by the means substantially as described and for the purposes above set forth.

73,713.—METALLIC TIE FOR COTTON BALES.—Theodore Guyol, New Orleans, La.

I claim, in connection with a copper or other suitable wire for encircling and fastening bales of cotton, or other baled material, a metallic saddle, A, with its brace, c, constructed and operating to hold the two ends of the wires substantially as herein described and represented.

73,714.—MACHINE FOR CUTTING SOAP.—Joseph Hadfield, New York city.

I claim, 1st, The combination and arrangement of the movable table, C, the follower, D, and the racks, E E, which are attached as specified to the follower, substantially as described.

2d, The arrangement and combination of the latch, K, attached to the table, C, with the cam, J, for the purpose of detaching the table from the follower, substantially as described.

3d, Making the follower, D, separate and detachable from the rest of the machine, and attaching it thereto by means of removable pins, n n, substantially as described, for the purpose of being able to change the follower at pleasure.

4th, The arrangement and combination, with the printing roller, M, of the bars, G H, and the gear wheels, F, F1, F2 and I, substantially as and for the purpose described.

5th, The moistening roller, Q, arranged and combined with the printing roller, M, substantially as and for the purpose described.

6th, The cutting frame, R, made substantially as described, with the truss, V, and straining screws, X X Y, for tightening the wire, z.

7th, Making the several cutters of the cutting frame of a single strand of wire, substantially as described.

8th, The transverse cutting wire, f, combined and arranged substantially as described, with the sliding rods, c, the slotted tubes, d, the springs, e, and the shaft, B, whereby the soap is divided transversely, during the return movement of the table.

73,715.—APPARATUS FOR DRAWING TAPERED TUBES.—Gustavus Palmer Harding, Chiswick, England. Patented in England Sept. 14, 1865.

I claim the combined arrangement herein described, with reference to figs. 1 to 8 of the drawings, consisting of the parts, h h ij j1 j2, with suitable gearing for giving motion thereto, when a tube or rod is being drawn by hydrostatic or other power, substantially as above described.

73,716.—RICE HULLING MACHINE.—J. Moore Hendricks, Philadelphia, Pa.

I claim, 1st, The cylinder, o, in combination with its shaft and corrugated curved arms, q, for abating the cuticle and removing the same from the rice, substantially as set forth.

2d, The combination of the mortar and pestle, k l, the cylinder, o (with its shaft, p, and corrugated arms, q), and the polishing cylinder, u, with its covered drum, all constructed and arranged in the manner and for the purpose substantially as set forth.

73,717.—STONE-DRILLING MACHINE.—Charles W. Hermance, Saratoga, N. Y.

I claim, 1st, The arrangement of the follow blocks, E, and their lifting pawls, e, with the cross head, H, and its lugs, a, and the plates, o, for the purpose of lifting and discharging said cross head, as is herein set forth.

2d, In combination with the cross head, H, and rod, I, thus operated, ratchet wheel, K, lever, J, and slotted guide, L, all constructed as described for the purposes set forth.

3d, In combination with the follow blocks, pawls and cross-head carrying the drill rod, the arrangement of the pitman, F G, and wheels, G G, all constructed and operating substantially as described.

73,718.—STOVE-PIPE COUPLING.—Orlando, M. Higgins, Lowell, Mass., assignor to himself and Freeman Higgins, Manchester, N. H.

I claim, 1st, The endless metal band, a, and coupling tubes, A, combined with the heads, b, for the purpose and substantially as described.

2d, The heads, b, constructed as described whereby the endless metal band may be adjusted, substantially as set forth.

3d, The partition, E, and screws, g, combined with the heads, b, and endless band, a, as and for the purpose set forth.

4th, The dampers, F, combined with the partition, E, heads, b, and endless band, a, in the manner and for the purpose substantially as described.

5th, In combination with the head, b, the slide, k, and holes, h, for the purpose and substantially as described.

6th, The perforated movable disk or stand, m, applied to the top of the case or heater, as and for the purpose described.

7th, The combination of all the correspondent parts specified, arranged for action and effect substantially as described and for the purposes specified.

73,719.—MODE OF PRODUCING A VIBRATING SWELL IN ORGANS.—Alonzo Hitchcock, New York city.

I claim the construction of a fan in sections, substantially as described for the purposes herein set forth.

73,720.—WOOD BENDING MACHINE.—Martin Van Buren Howe (assignor to himself and Levi Heywood), Gardner, Mass.

I claim the coupling links, a, or their equivalents, for connecting the ends of the links, A, of a chain for bending timber, constructed to operate substantially as and for the purpose set forth.

73,721.—TILTING CHAIR SEAT.—Martin V. B. Howe (assignor to Heywood, Brothers, and Co.), Gardner, Mass.

I claim connecting the seat of a chair to the rear posts, E F, or their cross bar, D, by means of springs, b, substantially as and for the purpose set forth.

Also the stop, e, in combination with the above, substantially as and for the purpose specified.

Also the springs, b, constructed, applied, and operating substantially as and for the purpose set forth.

73,722.—MANUFACTURE OF SODA AND POTASH.—A. G. Hunter, Flint, Wales.

I claim the process herein described of decomposing chloride of sodium and chloride of potassium for the purpose of converting them into silicated, carbonated or caustic alkali.

73,723.—SPOKE SHAVE.—Seth T. Hutchins (assignor to Horace A. Lathrop), North Anson, Me.

I claim, 1st, The combination of the separate abutments, D E, applied to the stock, A, so as to be adjustable in manner as described with the gage, C, hinged to one of such abutments and being separate from the other and to operate with respect to it, substantially as explained.

2d, Also the application of the gage to its adjusting devices so as to be removable from them or either of them and the knife when the means of the adjustment of the gage is held stationary relatively to the stock, as described.

73,724.—CLOSING FRUIT JARS.—William L. Imlay, Philadelphia, Pa.

I claim, 1st, The rectangular recess or cavity, E, in the neck of the jar with its inclined and corrugated side, F, retaining the bail and tightening it by sliding the bail over the corrugations, as shown and described.

2d, The combined arrangement and construction of the jar, A, cover, B, bail of hoop, C, with its springs, D, plain round recess, G, rectangular and inclined recess, E, corrugations, F, substantially as and for the purposes specified.

73,725.—DUMPING CART.—Asa A. Jennings, Webster, N. Y.

I claim in combination with the pivoted sections, B B, the rigid sides, f f, of the body, A, and the transverse and longitudinal braces, x x and y y, connecting the same with the bolsters, substantially as and for the purposes set forth.

73,726.—SODA FOUNTAIN.—J. C. Johnson, Philadelphia, Pa.

I claim a soda-water fountain which is constructed with a confracted perforated bottom and a flanged foot piece, B, and provided with a removable bottom, C, fitted within said fountain upon a seat which surrounds an oblong opening, c, and held in place by means of a screw, b, and external cap or bar, D, substantially as described.

73,727.—FELTED FABRIC.—Moses A. Johnson, Lowell, Mass.

I claim the manufacture of felt cloth by forming the bat and as it is fed to the felter of a series of side drawings or rovings laid together lengthwise or crosswise or lengthwise and crosswise both and run in from spools, creels, or otherwise, substantially as herein described and represented.

73,728.—DIES FOR HEADING BOLTS.—Charles Kane, Pittsburg, Pa. Antedated January 16, 1868.

I claim the inclining of the plane of the ledges in the direction of the griping dies and from the axis of the bolt in combination with pressing surfaces parallel to the axis of the bolt, as specified.

73,729.—CASKET FOR PRESERVATION OF CORPSES.—Charles H. Kimball, Quincy, Mass.

I cloim, 1st, The ice chamber or casing, a, in combination with the compartments, A and B, as and for the purpose set forth.

2d, Also the ice chamber, a, in combination with the compartment, A, and air spaces, s, s, as and for the purpose specified.

3d, Also the casing or opening, b, in combination with the ice chamber, a, as and for the purpose set forth.

73,730.—JAPAN PASTE BLACKING.—Henry Lake, San Francisco, Cal.

I claim the making of a superior article that I call the Japan Paste Blacking of the commodities specified, and substantially as set forth.

73,731.—HAY RAKE AND LOADER.—Stephen M. Livingston, Claverack, N. Y. Antedated January 17, 1868.

I claim, 1st, The combination substantially as described of the rake the balance levers, the rope and windlass, whereby the rake can be controlled from the front of the wagon, as set forth.

2d, The combination as described of the rake arms or balance levers mounted on the detachable frame with the pressure springs mounted on the main frame.

73,732.—CALCULATING MACHINE.—James A. Loomis and Alonzo Johnson, Springfield, Mass., assignors to themselves and Charles Gifford, Gardiner, Me., and said Loomis and Johnson assignors to Charles Gifford.

We claim, 1st, The plates, A D and E, when connected by the pins, b and e, respectively and when operated by means of the pointer, H, all made substantially as herein shown and described.

2d, The plates, A D and E, and pointer, H, in combination with the pawl, j, plate, G, and ratchet disk, I (or I and J), all made and operating substantially as herein shown and described.

3d, The device for counting the hundreds consisting of a combination of the spring, F, with the lug, o, on spring, n, and with the disks, A D F, and pin, m, all made and operating substantially as herein shown and described.

73,733.—PROCESS OF BLEACHING CLOTH, YARN, ETC.—Wheaton Luther, Niagara Falls, N. Y.

I claim, by the use of the chemicals herein mentioned, or by those which produce equivalent results, the process substantially as herein described.

Also immersing the article in the bleaching mixture while it is saturated with the acid.

73,734.—BUCKLE.—Frederick William Maes, Iserlohn, Prussia.

I claim a buckle composed of a separate axle, b, perforated to admit the tines, d d, and provided with journals at its ends which fit into boxes, e e, formed by the ends of the bow, a, as set forth.

73,735.—BUTTON FASTENING.—H S. Ma rane, Hoboken, N. J.

I claim an improved button fastener made in substantially the form and manner herein shown and described as a new article of manufacture.

73,736.—GRAIN SEPARATOR.—Thomas H. McCulloch, Monmouth, Ill., assignor to George H. Rich, Geneva, Ill., and George H. Rich, assignor to the Hart Grain Separator Company.

I claim, 1st, The employment of one or more cylinders with cellular convex surfaces, arranged and operating substantially as and for the purposes specified.

2d, Also in combination with said cylinders the employment of a brush or brushes, arranged and operating as and for the purposes specified and shown.

73,737.—ASH PIT COVER FOR STOVE.—William L. McDowell, Philadelphia, Pa. Antedated Jan. 14, 1868.

I claim the gravitating plate, E, and the sloping side plates, B B', in combination with the hearth plate, A, and the front plate, C, of a stove, substantially as and for the purpose set forth and described.

73,738.—THIMBLE SKEIN.—R. M. McGrath, Lafayette, Ind.

I claim, as a new article of manufacture the skein of cast iron with wrought-iron bands or supports, as herein set forth.

73,739.—PRIMING METALLIC CARTRIDGE.—Henry Meigs, Jr., Bergen Point, N. J.

I claim, 1st, The thin-edged radially-slotted centrally-perforated iron-disk anvil, constructed as described.

2d, The combination as described of the flange shell the radially-slotted centrally-perforated, thin-edged, iron-disk anvil and the central fulminate chamber, all constructed and arranged as described for joint operation.

73,740.—MACHINE FOR MAKING WOODEN BOWLS.—Henry Mellish, Walpole, N. H.

I claim, 1st, The hollow cylinder, E, when constructed with the cutter guide, H, or its equivalent, substantially in the manner and for the purpose above described.

2d, Also the concavo-convex cutter, G, when arranged in combination with the cylinder, E, to swing in a circle corresponding to its curve, substantially in the manner and for the purpose above described.

3d, Also the cutter, I, when constructed and arranged to operate with the cutter, G, and lever, F, or its equivalent, substantially as and for the purpose above specified.

73,741.—BRICK MACHINE.—George Metcalf, Leland, Ill.

I claim the vertically-oscillating frame, H, with its levers, A B and C, the mold cover, E, press block, D, and mold bar, M, with button and slide, F and u, all combined and arranged to operate substantially as and for the purposes set forth.

73,742.—PERMUTATION LOCK.—L. H. Miller, Baltimore, Md.

I claim, 1st, A perumtation lock so constructed as to bring the spindle or arbor which operates it on the outside of the lock proper, substantially as set forth.

2d, The two wheels, F G, capable of limited independent motion in combination with a suitable catch adapted to engage with the said wheels, F G, when they are properly adjusted and at other times riding on the unbroken periphery of the two wheels, substantially as explained.

3d, The flaring or under-cut rim, m2, of the rotary tumblers to adapt them for ready removal by hand, substantially as explained.

4th, The combination of the notches, m3, radial holes, m4, and pin, Q q, when constructed, arranged and employed substantially as and for the purposes specified.

73,743.—POTATO MASHER.—M. H. Monroe, Rochester, N. Y.

I claim the combination of the coil, a, stays or braces, b b b b b, and handle, c, all in the manner and for the purpose herein set forth and described.

73,744.—SPRING BED BOTTOM.—A. W. Newell, Bradford, Pa.

I claim the combination of the braces, E G, the boards, F H, with the springs, A, the cross bars, C, the casters, D, and the webbing, I, when constructed and operating substantially as and for the purposes described.

73,745.—LAMP CHIMNEY CLEANER.—Abram G. Newkirk, Warren, Pa.

I claim the rod or wire, B B, constructed and bent in the form substantially as shown and arranged in the manner and for the purpose specified.

73,746.—BLACKING BRUSH.—H. E. Newton, Manchester, N.H.

I claim the combination of the angularly-surfaced block, c, the angular handle, f, and the back, e, all in one piece connected to block, a substantially as set forth.

Also the combination of the block, c, handle, , and back, e, in one piece substantially as described.

73,747.—HAY RAKER AND LOADER.—W. T. Nichols, Rutland, Vt.

I claim, 1st, A combined hay rake and hay wagon in which the rake is made the wagon bed, whereby the separate uses and purposes of a hay rake and hay wagon can be accomplished by one and the same machine using the same for either purpose at will and by which hay and grain can be raked and loaded at the same time without any intermediate appliance other than the rake itself, substantially as set forth and described.

2d, The device of a rake which for purposes of transportation may be be raised to form a part of the bed of a wagon for carrying the hay gathered thereon, substantially as and for the purposes set forth and described.

3d, The combination of the unloading rope, H, and gathering rake, A, or their equivalents, substantially as and for the purposes set forth and described.

4th, A rake having four or more ground or carrying wheels, so that it may be used both for raking and caarying the hay when raked.

5th, A coupling device for connecting the rear and forward parts of the machine, substantially as described.

6th, The combination of the rake, A, hoisting lever, N, and hinged clapper K, or their equivalents, substantially as and for the purposes set forth.

7th, The teeth extending in rear of their supporting axle so that the rake and its load may be balanced upon said axle, or nearly so, substantially as and for the purposes set forth.

73,748.—HAY STACKER.—W. T. Nichols, Rutland, Vt.

I claim a hoisting machine, for unloading hay or other purposes, composed of a lever beam, B, attached to four or more legs, A, revolving upon fulcra, H H, operated by rope, C, or their equivalent, substantially as set forth and described.

73,749.—FOLDING BASKET.—A. M. Olds, New York City.

I claim, 1st, as an improvement in the art of constructing baskets, boxes, or crates, forming the sides of a series of slats or bars, united at the corners by means of a wire or rod passing through them, and pivoting the same together, so as to permit the article to be folded, substantially as described.

2d, Also, the folding bottom, when constructed and arranged to operate substantially as set forth.

73,750.—POLING HOPS.—Garret J. Olendorf and Albert O Parsball, Middlefield, N. Y.

We claim the herein described combination and arrangement of the poles A, cords, B, and rings, C, as and for the purpose set forth.

73,751.—FILTER.—George T. Palmer, Brooklyn, N. Y. Antedated January 16, 1868.

I claim, 1st, the combination and arrangement of the filters, B B' B", wate

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channels, H and a, valves, i i' i", and b b' b", and stop cocks, k k' k" and l, in manner substantially as shown and/or the purpose set forth.

2d, The removable filter, B, having an inside water chamber, g, provided with a neck or pipe, o, all constructed substantially as shown.

3d, The ribs, f and s, on the inside of the perforated plates, c c, arranged in relation to each other substantially as set forth and for the purpose specified.

4th, The arrangement and combination of the coarse wire supporting screen, D, with the perforated plates, c c, fine wire confining screen, E, and filtering medium, F, as and for the purpose shown and described.

5th, A filter containing chest having casing, A A, partitions, A' A", water channels, H and a, valves, b b' b" and i i' i", and cocks, k k' k", arranged substantially in the manner shown.

73,752.—RAILROAD SWITCH.—William P. Patton, (assignor to William P. Patton, Theophilus Weaver and Isaac Lloyd,) Harrisburg, Penn.

I claim, 1st, the arrangement of a lock shield and key, in combination with the shifting mechanism of a railroad switch, so that the key can only be withdrawn from the lock when the switch has been returned to the main track, and been locked in that position, substantially as set forth.

2d, Also, the guard, L, in combination with the key, 2, and a lock, attached to the shifting mechanism of a railroad switch, substantially in the manner and for the purpose set forth.

73,753.—ENHARMONIC KEY BOARD FOR ORGANS, &C.—Henry Ward Poole, South Danvers, Mass.

I claim, 1st, the four broad white keys, and the three elevated black keys, in each octave and in each signature, arranged in the positions and relations substantially as described and shown.

2d, The arrangement of keys divided into the five series of key notes, thirds, perfect sevenths, dominant thirds, and dominant sevenths, each series being uniform in shape, color and size, but different from the other series, substantially as described and figured.

3d, The pedal key board, containing the three rows of pedals for the three series of sounds, key notes, thirds, and sevenths, arranged in a series of fifths, substantially as shown and described.

73,754.—NECK YOKE SLIDE.—George Purple, Wellington, O.

Antedated January 16, 1868.

I claim a slide, constructed in the manner as described, as a new article of manufacture, for the purpose set forth.

73,755.—SPRING BED BOTTOM.—Barney Rear, Toronto, Canada.

I claim the combination of the springs, E, sockets, F, and webs, C C, supported by a frame having detachable side pieces, A, substantially as and for the purposes set forth.

73,756.—PREPARATION OF DYE.—John Reynolds, San Francisco, Cal.

I claim a new article of manufacture in a preparation for dyes of the materials specified, and substantially as described.

73,757.—INJECTOR FOR STEAM GENERATOR.—Samuel Rue, Jr., Chester County, assignor to himself, Samuel McCambridge, and Edward G. Martin, Philadelphia, Pa.

I claim the construction and arrangement of the receiving chamber, A, with its nozzle, B, the water receiving chamber, C, and adjustable plug, E, substantially as hereinbefore described.

73,758.—ANCHOR.—John W. Russell and David Joline, Tottenville, N. Y.

We claim the combination of the double and pivoted flukes with the double shanks of the anchor, when constructed substantially in the manner and for the purpose as herein described and shown.

73,759.—GAGE FOR SEWING MACHINE.—T. S. Scranton, Madison, Conn.

I claim the arm, C, combined with the elastic guide, D, the said guide being attached to the arm, C, and the said arm made elastic at or near its connection with the gage by the reduction of the said arm, substantially as herein set forth.

73,760.—CONDENSING CARDING MACHINE.—John C. Shaw, Manayunk, Pa.

I claim, in combination with the collar, D, of the roll, C, and bracket, A, the slotted plate, B, and set screw, E, substantially as and for the purpose set forth.

73,761.—FENCE.—A. Sheldon, Greenwich Station, Ohio.

I claim the bar, a', provided with rounded corners, so that the gate on being opened will easily vibrate, as indicated by the dotted lines, d, thereby allowing it to pass readily over obstructions, in combination with the rails, A, cross bars, B, in the manner and for the purpose specified.

73,762.—STOVE DRUM.—Antonio F. Smith, Ellsworth, Me.

I claim the arrangement as well as the combination of the hollow frustum, B, with the deflector, D, and the box, A, provided with induction and eduction passages or conduits, b E, arranged in it as specified.

Also, the arrangement as well as the combination of the auxiliary air chamber, F, and its air register or valve, and opening or openings with the box, A, the frustum, B, or the said frustum and its deflector, D, the whole being substantially as specified.

73,763.—CARRIAGE TOP.—William Smith and Emery M. Pike, McDonough, N. Y.

We claim, 1st, the construction of the sleeve, c, the brace stay, d and e, when made and used as and in the manner described.

2d, The sway piece, g, when made and used as and for the purpose described.

3d, The arrangement of the sway piece, g, and the brace stay and segment, o and d, in combination with the sleeve, c, and spring, b, for tilting and holding the top in any desired position.

73,764.—CAR STARTING APPARATUS.—Joseph Steger, New York City.

I claim the springs, e c, in combination with the traction bar, H, rope or chain, a, lever pawl, i, drum, G, and ratchet wheel, D, all constructed and operating substantially as and for the purpose set forth.

73,765.—METALLIC LATHING.—J. F. Walter, Jr., New York City.

I claim sheet metal lathing, formed with oblong apertures, A A B B, the same being punched in the metal, so as to produce the projecting lips or burrs, a a, at the edges thereof, substantially as herein specified.

Also, the overlapping or "break joint" arrangement of the alternate rows of apertures, A A and B B, substantially as and for the purpose herein set forth.

73,766.—COMBINED CHURN AND ICE CREAM FREEZER.—Geo. C. Westover, Paducah, Ky.

I claim the revolving inside cylinder, H, pivot, J, beaters, K K, and wire wing, L, when arranged, combined, and operated as herein described, and for the purposes set forth.

73,767.—GRATE.—John H. Yocum, Ashland, Pa.

I claim, 1st, The provision, in a grate, of one or more openings, E, to permit the removal of slag, clinkers, stones, and other substances too large to be raked through the interstices of the grate bars, substantially as described.

2d, The bars or shields, F, in combination with the enlargements or extensions, G, to form shields to the openings, E, substantially as and for the purpose set forth.

73,768.—STRAIGHTENING CLUB FEET AND CROOKED LEGS.—H. R. Allen, M. D., Charleston, Ill.

I claim, 1st, the employment of a jointed frame, substantially as shown at A B D C D', and straps, E F G, in combination with any constant spring tension applied to the said frame for the purpose of straightening it when on the limb, and thereby overcoming any anchylotic rigidity of the knee or ankle joints of the said limb, all as set forth.

2d, The vertically movable foot plate, J, substantially as shown and described, in combination with its proper spring attachment, as described, or other equivalent device, and frame plates, C, as and for the purposes set forth.

3d, The latterally moving foot plate, I, in combination with the bearing plates, L and O, and lateral spring attachment, all substantially as shown and described, and for the purposes set forth.

4th, The lock, S, substantially as shown and described, or other equivalent device, in combination with the frames, A and C, substantially as and for the purpose shown and described.

5th, The spring attachment, consisting of the hooked wire, f', shoulder lugs, k', springs, g', and burr, i, constructed and operated substantially as shown and described, in combination with the foot plate, J, and frame plate, C, for the purpose of removing anchylosis, all as set forth.

6th, The foot strap, G, or other equivalent device, in combination with the movable foot plates, J and I, of an apparatus for straightening feet or lower limbs, all substantially as shown and described, and for the purpose set forth.

7th, The elastic strap, H, or other equivalent device, applied, substantially as shown and described, to the frame plate, A, of an apparatus for removing anchylosis, all as and for the purpose set forth.

8th, The metallic strap, P, or other equivalent device, in combination with the strap, G, and movable foot plates, J and I, substantially as and for the purpose shown and described.

73,769.—BROOM.—Nathan E. Badgley, New York City.

I claim the combination of the scalloped edged cap, D, its neck, E, the tying of broom corn in one place, and securing the same with cord, C, to the square end of handle, B, all as and for the purpose herein described.

73,770.—SPRING BED BOTTOM.—A. Milton Blake, Canton, O.

I claim the arrangement and combination of the slats, F G, straps, D D, bungs, H H, and springs, A A, when said slats, F G, are so arranged as that each alternate one is supported by a spring, A, and the others by the straps, D D, substantially in the manner and for the purpose herein specified.

73,771.—DEVICE FOR OPERATING PUMPS.—Elijah Borton, Morris, Ill.

I claim the eccentric segment, F, supported at b upon the bed piece, B, the eccentric semi-circular gears upon the lever, D, sliding vertically in the slot, i, the upper eccentric segment, E, sliding vertically in the slotted frame, B', and pivoted to the arm, G, carrying the pump rod, C, all constructed and arranged to operate as herein shown and described.

73,772.—REIN HOLDER.—Charles A. Bradford and Wesley Bradford, Crown Point Centre, N. Y.

We claim the bar, A, having the worm, a, at its lower extremity, in combination with the eyes, b, and clamp, C, in manner substantially as above set forth and described.

73,773.—SHOES.—Libertine Bullard, Marlboro, Mass.

I claim the combination of the parts, A or A', B and C, constituting, respectively, the vamp, quarter, and counter of a shoe, when the said parts are cut in the form and secured together in the manner shown and described.

73,774.—TELEGRAPH REPEATER.—J. H. Bunnell, New York City.

I claim, 1st, the employment of two governor magnets, placed in the same local circuit as the respective local sounders in a telegraphic repeater, when the said governor magnets are there placed for the purpose of making the repeater self-breaking, and controlling its operation, substantially as herein shown and described.

2d, A governor magnet, wound with wire of such relative size and resistance to that upon the local magnet, as that when both are included in the local circuit, the governor magnet shall be charged while the local magnet is not.

3d, The combination of fine wire governor magnets, as herein described, with the regular local batteries and sounder magnets of a repeater, as and for the purpose set forth.

73,775.—VEGETABLE CUTTER.—J. Caldwell, Chillicothe, O.

I claim, 1st, the rear extension, B, in combination with the platform, A, and horizontal knife, D, substantially as herein set forth and described.

2d, The box, E, provided with the grooves, e, in the bottoms of its walls, substantially as herein shown and described.

73,776.—VENTILATING MILLSTONES.—Jas. Campbell, Peoria, Illinois.

I claim the hoods, g g, and the pipes, e e, passing through the cap piece, B', the channels, e' e', in the runner, B, the washer, c, the flange, h, and the vent holes, m m, in the curb, D, all arranged and operating as and for the purpose herein described.

73,777.—CHECK REIN HOOK.—J. S. Campbell, Newton, N. J.

I claim the hinged tongne, B, in combination with the plate, b, for attachment to the check rein hook, substantially as set forth.

73,778.—BUTTON FOR CARRIAGE CURTAINS.—Stillman P. Campbell, Quincy, Mass.

I claim the button, B, provided with a stem, part of which is rectangular, in combination with a pressure spring, S, the whole constructed and operating substantially as and for the purpose set forth.

73,779.—CANE MILL.—B. F. Cauffman, Millerstown, Pa.

I claim the combination and arrangement of the compartments, c c', partition, D, and curved perforated plate E, substantially as and for the purpose specified.

73,780.—STEAM GENERATOR.—Edwin Chapman and Charles T. Allaire, Rochester, Minn.

We claim the steam generator, constructed as described, consisting of the conical furnace, D, having the air tube, F, and supporting the conical combustion chamber, E, the points of their connection forming shoulders, connected by the diving flues, J, with the casing, B, enclosing the water space, and placed concentrically within the outer casing, A, the space between said casings forming the ascending flue, H, all arranged and operating as herein shown and described.

73,781.—HEATING RAILROAD CARS.—Robt. A. Chesebrough, (assignor to William H. Chesebrough,) New York City.

I claim, 1st, the arrangement, in a railroad car, of steam pipes, a b, in combination with registers, g h, or equivalents, whereby the heat can either be thrown into or to the outside of the car, without interrupting the action of the steam in the succeeding car or cars, substantially as set forth.

2d, The arrangement, with a railroad car, of inside and outside steam pipes, when constructed and applied substantially as described in fig. 3, for heating purposes.

73,782.—HEAD REST FOR SEATS.—James R. Chiles, Richmond, Va.

I claim the head rest, C, when made adjustable by means of a ratchet, r r, substantially as and for the purpose specified.

73,783.—PADDLE WHEEL.—Rowland Cromelien, Washington, D. C.

I claim the combination of paddles or buckets with annular toothed wheels, operated substantially as described for the purpose specified.

73,784.—PUNCHING AND RAISING DISKS FROM METAL.—Charles Diedrichs, Philadelphia, Pa., assignor to James S. Mason & Co.

I claim the combination of the punch, G, stamp, J, feed board, K, consisting of the parts, l m n n', and carrier, N, sliding beneath the punch in the channel, M s, and advancing but one disk directly to the stamp before another is cut, substantially as described.

73,785.—WASHING MACHINE.—Wm. Eberhard (assignor to himself and A. P. Baldwin), Akron, Ohio.

I claim, 1st, The washing machine constructed as described, and consisting of the rollers, B C, frame, A, shaft, b, vibrating frames, g g, pitman, b, crank shaft, k, shaft, e, crank, m, worm, d, pinion, c, fly and gear wheels, lever, p, and rod, n, all arranged and operating as described and for the purpose specified.

2d, In combination with the vibrating frames, g, and roller, C, the lever, p, and rod, n, substantially as and for the purpose set forth.

3d, In combination with roller, B, the guards, q, substantially as set forth.

73,786.—GUNPOWDER.—L. H. G. Ehrhardt, London, Eng., assignor to Geo. B. Upton, David D. Stackpole, and Samuel H. Gookin,

I claim the powder herein described, consisting of the ingredients named, prepared and mixed as described.

73,787.—ARTIFICIAL LEG.—Ephraim Elliott and Charles E. Newton, Lowell, Mass.

We claim, 1st, The self-adjusting sockets, e and e', for the purposes substantially as described and set forth.

2d, The extensions, i i and j j, applied to the upper and lower sockets, b b' and c c, for the purpose of adjusting the same in position, as described and fully set forth.

3d, An artificial leg provided with straight side beams, a a, bands, b b' c c' and d, when arranged as herein described and for the purpose set forth.

4th, The double stop, h h, in combination with the straight side beams, a a for the purposes as described and set forth.

5th, The arrangement and combination of the thumb wheel, o', ratchet, o, pawl, p, and frame, m m, for the purpose substantially as described.

6th, The combination of the ankle seat, q, pivots, u u and w, block, v, and adjustable heel cord, t, when arranged to operate substantially as described and set forth.

73,788.—HARVESTER.—E. Emmert, Franklin Grove, Ill.

I claim the combination of the fingers and cutter bar with the notched pitman, when the latter is pivoted to the outer end of the cutter bar, for the purpose of scattering the cut grass, as herein shown and described.

73,789.—CAR REPLACER.—Daniel Fisher and William Cumming, Oil City, Pa.

We claim, 1st, The universally pivoted reversible inclines, C D, constructed and adapted to operate substantially as and for the purpose described.

2d, The pivot, c4, in combination with the reversible guide, c1, incline, C, and bearing, E, substantially as set forth.

3d, The combination of the dog, F f f1 f2, bearing, E, and incline, C, substantially as described.

4th, The combination of the dog, I i i1 i2, bearing, G, clamp, H, and incline, D, substantially as and for the purpose specified.

5th, The adjustable support, d2, substantially as and for the purpose set forth.

73,790.—NECK TIE.—Henry G. Fisk and Thomas J. Flagg, New York city.

We claim as a new article of manufacture a scarf, constructed as described, consisting of the cylindrical knot, A, to which the scarf, B, and apron, C, are attached, said knot provided with an elastic pocket, which expands to permit the scarf, B, to pass through, and contracts to hold it in place, as herein shown and described.

73,791.—BALE FASTENER.—Addison C. Fletcher, New York city. Antedated Jan. 16, 1868.

I claim a bale fastener composed of a plate, A, provided with an opening, a, and a slot or slots, b, one or both of the latter having arches, c, at their sides, for use in connection with a pin or nail, or pins or nails, D, to secure the bent or doubled end or ends of the baling hoops or wires, substantially as specified.

73,792.—HARROW.—Emanuel Forney, Fishersville, Pa.

I claim, 1st, The combination with the main frame of the harrow, of two or more sets or pairs of revolving frames or arms for carrying the teeth, tilted or set at angles to the main frame, in the manner described, and arranged to gear or mesh with each other, substantially as herein shown and for the purposes set forth.

2d, The combination with the harrow frame of the reversible drag bar and eye bolt, or equivalent means for holding the said bar in position, under the arrangement and for operation as herein shown and specified.

73,793.—HEATING STOVE.—T. J. Frazier, St. Paul, Minn.

I claim the combination of the flues, D, up-take, E, and bulk head, B, substantially as described, or their respective equivalents, with a stove, as herein set forth.

73,794.—BAG FOR PACKING TOBACCO.—G. W. Gail, Baltimore, Md.

I claim a bag for packing tobacco, when folded as described, and secured by means of a cord passing round its center, substantially in the manner set forth.

73,795.—OIL CUP FOR LUBRICATING SHAFTS.—Emerich J. Gerdom and Charles W. Schindler, Albany, N. Y.

We claim in combination with an oil cup, A, a shaft, S, constructed of tubes, communicating with the journal, J, and rotated by the motion of the journal, substantially as and for the purpose described.

73,796.—SCREEN ATTACHMENT FOR WASH STAND.—Edward F. Gilbert, Lyons, N. Y.

I claim, 1st, The combination of an adjustable screen, covered with oil cloth or equivalent, with a wash stand so arranged that it may be raised or lowered at will and hidden from view when not in use, substantially as herein set forth.

2d, The combination of the wings, C C, with the adjustable center, B, so arranged as to expand and retain the screen, elevated, or to fold to be depressed from sight, substantially as herein set forth.

73,797.—CORN PLANTER.—Jas. Gilbert, Wyalusing, Wis.

I claim, 1st, Connecting the plow standards, S, to the frame, A, by means of the rollers, U, substantially as hererin shown and described, and for the purpose set forth.

2d, The combination of the levers, V, and connecting rods or chains, W, with the plow standards, S, and frame, A, for raising, lowering, and supporting said standards, substantially as herein shown and described.

3d, The combination of the weighted elbow lever, O, and shaft, M, having arms or stirrers, N, attached to it, with the seed box, G, and with the projections, R formed upon or attached to the dropping cylinder, H, substantially as herein shown and described, and for the purpose set forth.

4th, The combination of the harrows, Y, with the plow standards, S, and frame, A, substantially as herein shown and described and for the purpose set forth.

5th, Applying the draft below the horizontal plane of the frame, A, substantially as herein shown and described, and for the purpose set forth.

73,798.—CONSTRUCTION OF SOLDERING IRON.—Joel Gleason, Whitestone, N. Y.

I claim constructing a soldering tool formed of the copper point, A, screwed into a cast iron base, B, and provided with a wrought iron handle, C, as and for the purpose herein described.

73,799.—BED BOTTOM.—F. C. Gridley, Hudson, Wis.

I claim the arrangement of the bars, b and G, elastic straps, g g, and slats, D D, in the construction of a bed bottom, when such bottom is made in sections, and adjustable in the manner shown and described.

73,800.—GRATE FOR STOVES AND FURNACES.—J. W. Griswold, Philadelphia, Pa.

I claim the conical rotating grate, B, in combination with the cylinder, A, both provided with teeth, i i, at the base, constructed, arranged, and operating substantially as and for the purpose herein described.

73,801.—BABY HOLDER.—Robert Hale, Chicago, Ill.

I claim an improved suspended baby holder, formed by the combination of the wo larger hoops or rings, A, the two smaller hoops or rings, C, the cloth or equivalent coverings, B and D, the three or more supporting straps or cords, E, and slide or buckle, H, with each other, substantially as herein shown and described, and for the purpose set forth.

73,802.—COUCH OR CRADLE.—Robert Hale, Chicago, Ill.

I claim an improved portable suspended couch or cradle formed by the combination of the jointed frame, A, removable cover or bottom, F, straps or cords, B, and adjustable cord or strap, D, and slide or buckle, E, with each other, substantially as herein shown and described, and for the purpose set forth.

73,803.—MACHINE FOR CLEANING GRAIN.—Thos. Hancock and J. H. Leaman, Richmond, Va.

We claim, 1st, The combination of the hollow rollers or cylinders, B and C, having small holes or cavities formed through or partly through their walls, with each other, and with the frame in which they work, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the bars, D, and spouts, F, with the interior of the hollow cylinders, B and C, substantially as herein shown and described, and for the purpose set forth.

3d, The combination of the guard plates or bar, G, with the exterior of the cylinders, B and C, substantially as herein shown and described, and for the purpose set forth.

4th, Forming shallow grooves, H, around the lower ends of the cylinders, B and C, for the escape of the fine seed, substantially as herein shown and described.

73,804.—METALLIC HANDLE.—Jas. Hatton, New York city.

I claim constructing the handles for files, screwdrivers, and for other purposes, of metal, with elastic packing, substantially in the manner herein shown and described.

73,805.—CULTIVATOR.—J. T. Herndon, Bancroft, Mo.

I claim, 1st, The combination and arrangement of the beams, E J, connected by chains, U, to pulleys, V, on the shaft, W, substantially as and for the purpose set forth.

2d, The connecting of the inner beams, J J, by the bar, h, and the attaching of the uprights, g g, on said beams, to the arms, Q, by the bars, N, arms, O, and shafts, P, for the purpose of giving a lateral movement to the shares or shovels, L, substantially as and for the purpose specified.

73,806.—SKATING RINK.—I. H. A. Hervey, Cleveland, Ohio.

I claim a skating rink provided with a cold air trunk, D, extending partially or entirely around its foundation or lower part, and provided with doors, b b', at its inner and outer sides, for the admission of external air in connection with the openings, a, in the roof of the rink, all constructed and arranged substantially in the manner as and for the purposes set forth.

73,807.—LAWN MOWER.—A. M. Hills, Hockanum, Conn.

I claim, 1st, The balanced frame on the roller, E, provided with the fixed cutter bar, D, in combination with the ball-shaped rod, Q, to which the handle S, is secured, all constructed and arranged substantially as and for the purpose set forth.

2d, The horizontal cutter, M, having the spiral flanges, c c, when adjustably hung in the slotted upright, O, upon the covered shoe, N, and in front of the cutter constructed as described for the purpose specified.

3d, The combination of the frame, roller, cutting device, and the handle attachment, all constructed and arranged to operate in the manner substantially as and for the purpose set forth.

73,808.—PICTURE-FRAME SUPPORTER.—Leonard L. Hodges, Boston, Mass.

I claim the combination of the catches and catch racks with the suspension cord and picture frame, the whole being substantially as described.

73,809.—ICE PICK.—S. G. Hoyt, New York city.

I claim an ice pick consisting of a handle, A, having a many-pointed pick, B, at one end, and a single-pointed pick, C, at the other end, substantially as and for the purpose herein shown and described.

73,810.—SUGAR MOLD.—John S. Inskeep, West Middleburg, Ohio.

I claim a sheet metal box, B, having its vertical corners loose or detached, in combination with a frame, A, into which it fits, and within which it is supported by its horizontal edges or flanges, substantially as described and for the purposes set forth.

73,811.—CURTAIN FIXTURE.—Charles R. Jenkins, Philadelphia, Pa.

I claim interposing between pulley cap and roller a tube of india-rubber, yielding laterally and vertically, as and for the purpose described, and serving itself as a pulley for the cord.

73,812.—FELTED HAT BODY.—R. Johnson, Danbury, Conn.

I claim the admixture of wool and fur fibers, the former being cut into short lengths to equalize the relative weight of fibers, substantially as and for the purpose described.

73,813.—PIPE AND BOLT CUTTER.—G. B. Kirk, Newark, N. J.

I claim, 1st, The cutting tool, d, consisting of a fixed steel cutter, painted substantially as shown and described, in combination with the screw blank, l, stock, A, and adjustable claw, B, all constructed and operating as and for the purpose set forth.

2d, The flange, i, and pin, g, substantially as shown and described, or other equivalent device, when in combination with the holder, G, stock, A, and cutting tool, d, for the purpose set forth.

3d, The slot, n, substantially as shown and described, in combination with the cutting tool, d, and stock, A, all set forth.

73,814.—SAWING MACHINE.—P. P. Lane and J. T. Bodley, Cincinnati, Ohio.

We claim, in a cross-cut sawing machine, the combination of a reciprocating saw carriage with a graduated counter balance, constructed and operating substantially as described.

73,815.—BEARING FOR SHAFTS.—John F. Laplace, Hamburgh, Conn.

I claim, 1st, The perforated plate, E, carrying the balls, D, when such plate is arranged to turn loosely in the groove, constructed as described, in the flanges, a, of the disk, as herein set forth, for the purpose specified.

2d, The disk, B, constructed as described, bearing the perforated plate, E, held in place by the ring, b, and pins, c, in combination with the balls, D, shaft, A, and stationary plate, C, as and for the purpose specified.

73,816.—GAS ENGINE.—W. H. Laubach, Philadelphia, Pa.

I claim the combination and arrangement of the devices, as herein set forth, whereby the igniting flame is caused to pass directly through the inflammable gas, inside of the cylinder, substantially as herein set forth and described.

73,817.—HOOKS AND EYES.—William Law, Birmingham, England.

I claim the hook and eye, the latter constructed of a bar bent at right angles to the plane, and divided in the middle at m n, for engaging with the bent sides of the tongue, l, which fits in the angular part, O, of the eye, the sides, p and q, of the latter springing open to admit of the attachment, and closing upon the narrow part of the tongue, l, as herein shown and described.

73,818.—PICKER FOR LOOMS.—Richard Leach, Linwood Station, Pa.

I claim the combination of the pad, B, band, C, staple clasp, b, and screw, c, with the staff, A, all constructed, arranged, and operating as described.

73,819.—MACHINE FOR HULLING COFFEE.—Daniel Lombard, Boston, Mass.

I claim, 1st, The combination of the endless band, d, composed of serrated metal plates, with the serrated plate, e, provided with the sides, e', substantially as and for the purpose set forth.

2d, The combination of the endless band, d, the supporting frame, h i, and the elastic bearings, r', as described.

73,820.—HORSE RAKE.—C. O. Luce, Brandon, Vt.

I claim the oscillating axle, D, connected with the thills by the straps, a, segment rack, C, on the lever, b, footboard, B, segment rack, c', and curved teeth, e, in combination with the clearer bar, E, extending across the teeth, e, and supported by the curved bars, s, from the footboard, B, as herein described, for the purpose specified.

73,821.—MODE OF SUSPENDING CARRIAGE BODIES.—H. W. Libbey, M.D., Cleveland, Ohio.

I claim the special arrangement of the bars, D D, with their springs, d d, and the rods, E E, in combination with the running part of the carriage, provided with sliding extension bar, I, substantially in the manner shown, and for the purpose set forth.

73,822.—FAUCET.—John Marchbank (assignor to Wm. H. Low), Lansingburg, N. Y.

I claim, 1st, The arrangement of the guide brace, C, in relation to the gate, B, and body, A, substantially as and for the purpose herein set forth.

2d, The inclined plane, b, provided upon the gate, and arranged upon the gate, and in relation with the body, A, and the guide brace, C, substantially as and for the purpose specified.

3d, The inclined plane, c, arranged upon the gate, and in relation with the body, A, and guide brace, C, substantially as and for the purpose specified.

4th, The stud, a*, arranged upon the gate, and in relation with the guide brace, substantially as and for the purpose specified.

73,823.—DIE PRESS.—John Mays and E. W. Bliss, Brooklyn, N. Y.

We claim the solid boxes, E E, the sliding head, D, with V-bearings, and the adjustable gibs, a a, all constructed and arranged with the lever, substantially as and for the purpose herein described.

73,824.—PILE-CUTTING MACHINE.—John B. Mignault (assignor to himself and Alfred B. Hall), Boston, Mass.

I claim a cutter, X, pivoted loosely to a spring arm, W, in combination with a spring, Y, substantially as and for the purpose set forth.

Also, the combination of the adjustable block, Z, cutter, X, and bed, R, substantially as and for the purpose set forth.

Also, the lever 27, with its slotted arm, 29, in combination with the adjustable screw, 31, or its equivalent, substantially as and for the purpose described.

73,825.—THREAD AND YARN HOLDER.—Freeman F. Myrick, Dublin, N. H.

I claim the combination of the frame, A, with the spindle, B, substantially in the manner as and for the purpose set forth.

73,826.—HARVESTER.—Frederick Nishwitz, Brooklyn, N. Y.

I claim, 1st, A dumping box tilting diagonally on a rolling fulcrum, substantially in the manner and for the purpose described.

2d, The combination of a concave platform with a diagonally tilting dumping box, substantially as described.

3d, The combination of a reel rake, a concave platform, and a diagonally tilting dumping box, substantially as described.

4th, The combination of a reel rake, with a dumping box, tilting diagonally to the reel shaft, substantially as described.

5th, The combination with the tilting dumping box, of the tilting lever, operated either by the hand or foot of the driver, or by both combined, substantially as described.

6th, The combination of the projecting supporting arm, K, with the tilting platform or dumping box, rolling fulcrum, and retaining guide, substantially as described.

7th, The adjustable supporting arm, K, constructed and arranged as described.

73,827.—HARVESTER.—Frederick Nishwitz, Brooklyn, N. Y.

I claim the combination, in the manner described, of the concave platform, the reel rake, the reel supports, and the tilting dumping box, in an independ-

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ent frame, so that they can be bodily attached to or removed from the machine.

73,828.—TRY SQUARE.—H. L. Ogden, Atkinson, Ill.

I claim a try square, constructed as described, and consisting of the blade, B, provided with a slot, a, and pivoted within a slot in the handle, C, spring, F, and stop-pin, b, the square being provided with a graduated scale, all arranged and operating as set forth.

73,829.—SPRING DOOR HOLDER.—Joseph B. Okey, Indianapolis, Ind.

I claim a device for holding a door in any desired position, when constructed with the base, A, and standard, B, made in one piece, with the spring, C, held in position by the key, D, substantially as described and set forth.

73,830.—LATHE FOR TURNING IRREGULAR CURVED FORMS.—Walter Payton, London, England.

I claim 1st, The combination and arrangement of devices herein set forth, for cutting or planing curved forms, when operating in manner substantially as described.

2d, Also, the axes, F F, and L2 L2, when operated by rack and pinion, L L, and clicks, L6 L8, so as to give the desired progressive motions to the work to be cut or planed, or to retain such work stationary during the return motion of the cutters, in manner substantially as described.

3d, Also, the arrangement of the cutters, so as to admit of their several adjustments and correct action, in manner substantially as described.

4th, And also, the method of imparting motion to the support, NI, of the cutting tool or tools, by an adjustable arm, J9, and parts acting therewith, in manner substantially as described.

73,831.—PERMUTATION LOCK.—Oliver E. Pillard (assignor to Frederic H. North), New Britain, Conn.

I claim, 1st. The ring or blocking piece, o, suspended from the dog, i, in combination with the hub, g, and arm, 2, on the spindle, d, as and for the purposes set forth.

2d, The plate, or lip, 9, in combination with the hub, g, ring, o, and bolt, b, as and for the purposes set forth.

3d, The combination of the ring, o, dog, i, bolt, h, hub, g, lip, 9, and circular tumblers, k k, as and for the purposes set forth.

4th, The combination of the bolt, h, and hub, g, with the plate or flange, 9, that is notched, to allow the hub, g, to be moved to connect with the tumblers when the bolt is projected, but prevents the tumblers being acted on when the bolt is retracted, substantially as set forth.

73,832.—BOILER SCRAPER.—Auguste Poirel (assignor to himself and Pierre Bernard), New York city.

I claim, 1st, The construction of the metallic scraping disks, of unequal diameters, arranged upon the same rod, whereby each disk will perform a portion of the work without permitting the front disk alone to scrape the tube, as herein shown and described.

2d, The construction of the metallic disks, with perforations, to give them elasticity, whereby obstructions in the tube will not prevent the operation of the scraper, as herein shown and described.

73,833.—LIFTING JACK.—Lyman B. Prindle, Litchfield, Conn.

I claim the extension pawl, C D, as constructed, in combination with the ratchet or notched lever, B, and the single mortised and notched standard, A, whereby the fulcrum of the lever may be placed in any position for the hight of the article to be raised, as herein set forth.

73,834.—BURNER.—Samuel C. Pruden, Harmony, Ohio.

I claim a burner, made substantially as and for the purpose described.

73,835.—SINGLE HARNESS.—J. S. Reid, Orange, Ind.

I claim the straps, C C', when combined with the back strap, B, and shaft, A, substantially as above set forth and described.

73,836.—SCISSORS.—A. H. Rennie, Binghamton, N. Y.

I claim the combination of the blades, A B, handle, C, arms, a, wheel, b, crank, c, and pinion, d, substantially as described, for the purpose specified.

73,837.—BENDING MACHINE.—Wm. Richardson and Louis Ber Müller, Baltimore, Md.

We claim the combination of the roller, R, with the jointed frame which supports it, constructed substantially as described.

73,838.—METHOD AND MEANS FOR TREATING ORES OF GOLD AND SILVER.—Louis Edouard Rivot, Paris, France, assignor to Jacques Gaillardon, San Francisco, Cal.

I claim, 1st, The roasting of silver and gold ore by superheated steam in the manner as herein described, that is, by separating the ore from the flames by the interposition of cast iron plates, and by superheating the steam in the furnace itself, substantially as shown and set forth.

2d, The reverberating furnace, substantially as herein described, when provided with steam pipes on or about the fire bridge for discharging steam upon the sole, whether such furnace be arranged for burning vegetable or mineral fuel, as set forth.

3d, The arrangement, as herein shown and described, of a double furnace, or of a single furnace with two fire chambers, together with the use of cast iron plates at the level of the fire bridge, to separate the flames from the ore, substantially as set forth.

4th, The arrangement of the furnace herein shown and described, in which superheated steam is made to impinge upon the ore, when separated from the flames of the fire chamber.

5th, The method of amalgamating the roasted ore, without the adoption of any reagents, in apparatus of ordinary or suitable construction, substantially as herein shown and set forth.

73,839.—APPARATUS FOR AMALGAMATING GOLD AND SILVER ORES.—Louis E. Rivot, Paris, France, assignor to Jacques Gaillardon, San Francisco, Cal.

I claim the herein described method of and apparatus for amalgamating auriferous and argentiferous ores.

73,840.—TREATING ORES WITH SUPERHEATED STEAM.—Louis E. Rivot, Paris, France, assignor to Jacques Gaillardon, San Francisco, Cal.

I claim the herein described method of and apparatus for roasting argentiferous and auriferous ores, that is to say, the employment, in connection with superheated steam, of a rotary roasting cylinder, substantially in the manner shown and specified.

73,841.—TRUNK LOCK.—George Ruppel, Harlem, N. Y.

I claim the manner herein shown and described of attaching the cup, B, to the plate, A, and to the two parts of the trunk or bag, by means of sliding bolts, D D, and central head stem, C, all made and operating substantially as herein shown and described.

73,842.—HEAT RADIATOR.—S. B. Sill, Three Rivers, Mich.

I claim, 1st, The adjustable chamber, B, when furnished with valve, G, vertical plate, n, and horizontal plate, S, in combination with flue, D, the whole constructed and operating as set forth.

2d, The four radiating chambers, arranged in the manner and for the purpose specified.

73,843.—BRICK MACHINE.—James Simpson, St. Louis, Mo.

I claim, 1st, The combination of the pivoted arm, P, having receiving plate r, bar, S, and rod, t, with the cross head, h, compressers, F G, and opening, m, in the bottom plate, i, as herein described, for the purpose specified.

2d, The plate, n, and screw, o, in combination with the hopper, J, and compressers, F G, as herein described, for the purpose specified.

73,844.—MACHINE FOR MORTISING FENCE POSTS AND SHARPENING FENCE RAILS.—John A. Snyder, Georgetown, Pa.

I claim, 1st, The rail carriage consisting of the adjustable bar, D, mounted on the upright reciprocating carriage, C, and provided with the swiveling clamp standard, D1, the whole constructed and operating in the manner and for the purpose set forth.

2d, The reciprocating rail carriages, I and K, adapted to be moved in paths at right angles to each other in combination with the toothed racks and pinions for operating said carriages, the whole arranged and operating as described.

73,845.—RECLINING CHAIR.—B. L. Southack, New York city.

I claim a reclining chair constructed as described, and consisting of the fixed seat, A, binged back, C, and leg piece, E D, ninged rack bar, F G, pawl, H, lever, I, legs, a, arms, B, and hinges, a' b c c, all arranged and operating as described and for the purpose specified.

73,846.—FRUIT JAR.—Charles F. Spencer, Rochester, N. Y.

I claim the combination of the hinged loops, t, of cover, B, with the notched lugs, g, of jar, A, for the purpose of adapting to different thicknesses of the packing rings, and to different inclinations of their seats, the whole arranged as described and operating in the manner and for the purpose set forth.

73,847.—SHOE.—Laroy S. Starrett, Newburyport, Mass.

I claim as an article of manufacture the fastening, a a', when constructed and applied to a boot or shoe, as and for the purpose specified.

73,848.—LEATHER BELTING.—Wm. Strevell, Jersey City, N. J., and Geo. B. Kerper and Sidney B. Wells, New York city.

We claim, 1st, A leather belt produced by combining with a "side" a split, whether such split is from the same or a different "side," or whether it be continuous or in detached pieces, as described.

2d, Also a leather belt produced by combining with the inner or flesh surface of a leather side, a split from the corresponding or the flesh surface of another side, as described.

73,849.—VEHICLE.—George Stricker, Catawissa, Pa.

I claim the arrangement of the supplemental spring D, and the side springs C, the spring, D, having its ends attached underneath the axles, and the springs, C, having their rear ends attached at or above the upper side of the rear axle, and their forward extremities to the cross bar, b, substantially as and for the purpose specified.

73,850.—WATER WHEEL.—J. M. Tanner, Albert Lea, Minn.

I claim, 1st, The combination of the centrally pivoted arm, D, movable buckets, B, and body, A, all arranged and operating as herein described, for the purpose specified.

2d, The thin curved buckets, B, attached to the ends of arms, D, pivoted in recesses in the heads of the wheel, A, and operated and guided by wrist or guide pins, G, or by friction wheels or rollers, I, pivoted thereto, said pins or rollers working in eccentric grooves in the casing, H, of the wheel, substantially as herein shown and described and for the purpose set forth.

73,851.—INSECT GUARD FOR HORSES.—Bradley Treadwell, Reading, Conn.

I claim the insect guard, C, for horses, in combination with the bridle or halter, substantially as and for the purpose herein shown and described.

73,852.—HAND LOOM.—Clemens Unverzagt, Terre Haute, Ind.

I claim, 1st, The combination of the grooved plate, A, batten, F, feather, a b c, and traverse bar, F', when arranged and acting substantially as and for the purpose herein described.

2d, The triggers, K K', as set forth, in combination with the traverse bar, F', and its pins, e e'.

3d, The combination of the traverse bar, F', feather, a b c, and the grooved plate, A, constructed and operating as herein fully set forth.

4th, The ratchet bar, A', with its head, m, and lower inclined surface, x, in combination with the inclined bracket, B, and notched revolving plate wheel b, as and for the purposes set forth.

5th, The combination of the shaft, D, wheels, C C', pitmen, E E', batten, F, traverse bar, F', feather, a b c, and grooved plate, A, all as constructed and arranged, as is herein substantially set forth.

6th, The combination of the sliding ratchet bar, A', constructed as described, with the strap, C, cord, D, or their equivalents, when operated by the batten, F, for the purposes set forth.

7th, The arrangement and combination of devices herein set forth, by which the picker staffs are set and sprung alternately simultaneously by the backward motion of the batten.

8th, The combination of the picker staffs, L L, triggers, K K', and traverse bar, F', when arranged and constructed as is herein set forth.

73,853.—BRIDLE BIT.—George Webb, Lewiston, Me.

I claim my improved bit, as made, with each of its headstall hangers, C, and its martingale or curb-rein hitching arm, g, in one piece, to revolve on the cross bar, a, provided with rein rings or eyes, b b, as specified.

73,854.—TUBE WELL.—B. Weirich and H. H. Shartle, Middlebury, Ind.

We claim the perforated well tube, provided with a screw thread, a, around it, to receive different-sized coiled wires, whereby the openings between the coils of said wires are regulated, adapting the tube for use in fine sand or coarse gravel, as herein shown and described.

73,855.—MATCH BOX.—J. H. Wheeler, Addison, Vt.

I claim the combination with the box, A, of the sliding cap, J, slides, a g, separator, f c c', and slide lock, o, all constructed, arranged, and operating substantially as set forth and for the purpose specified.

73,856.—BUNG.—Eli White and Wm. Shilvock, N. Y. city.

We claim a busbing for the bung holes of barrels, etc., constructed with the body, B, flange, C, and prongs, D, substantially as described.

73,857.—COFFIN.—John C. Williams, Newton, N. J.

I claim as an improved article of manufacture, a coffin constructed as described, the bottom, A, provided with a rebate, a, fitting into the grooves near the lower ridges of the sides, B, the bottom and sides secured together by means of the head and foot boards, C D, grooved upon their inner sides, near their ends, b, and fitting over the rebates, c, upon the sides, B, and the lower edges of the said head and foot boards rebated, to fit over the ends of the bottom, A, preventing its longitudinal displacement, as herein shown and described.

73,858.—DITCHING PLOW.—J. L. Wilson and J. R. Haworth, Iowa Falls, Iowa.

We claim, 1st, The beams, R R, the gage beams, N N, and wheels, C, when combined and constructed as set forth.

2d, The levers, M M, constructed and operating in the manner specified.

3d, The mold boards, d, the supplementary mold boards, E, in combination with lever, P, the whole constructed and operating substantially as set forth.

4th, The wheel, U, in combination with colter, T, and shovel, e, when arranged and operating substantially as described.

73,859.—MANUFACTURE OF REFINED GRAHAMITE.—Henry Wurtz, New York city.

I claim the new chemical preparation or article of manufacture specified and described above, called by me Purified or Refined Grahamite, and obtained by the action of solvents upon the mineral Grahamite, substantially as above set forth.

73,860.—PREPARATION OF GRAHAMITE.—Henry Wurtz, New York city.

I claim, 1st, The separation from any impurities with which it may naturally occur commingled, of the mineral substance called by me Grahamite, by the use of a liquid medium or menstruum, substantially as above set forth.

2d, The separation of Grahamite into two distinct substances by the action of solvent media or menstrua, substantially as above set forth.

73,861.—PREPARATIONS FROM GRAHAMITE.—Henry Wurtz, New York city.

I claim the chemical preparation or article of manufacture specified and described above, called by me Beta Resinoid of Grahamite, or Irisine, and consisting of the residue left undissolved in the extraction from Grahamite of the vicosine, whether the said irisine be refined by solution in one of its solvents and evaporation or not, all substantially as set forth.

73,862.—PREPARATION FROM GRAHAMITE CALLED VISCOSINE.—Henry Wurtz, New York city.

I claim the chemical preparation or article of manufacture specified and described above, called by me Alpha Resinoid of Grahamite, or Vicosine, and obtained by the action of solvents upon the mineral Grahamite, substantially as set forth.

73,863.—BRICK MACHINE.—Edwin F. Andrews, Glasgow, Mo.

I claim, 1st, The vertical mold frame, K, constructed and operating substantially as and for the purposes specified.

2d, The combination of the plunger, H', with the mold frame, K, when constructed and operating substantially as set forth.

3d, In combination with the cams, C, and frames, D, the adjustable bars, E E', and flanges, b, for assisting the operation of the plungers to carry the clay, substantially as set forth.

4th, The frame, A, with rollers, F F, secured upon shafts, m m, above the throat, G, frames, D, operating plungers, H H', receptacle, V, knife, l, platform, J, with board, I, and frame, K, all constructed, arranged and operating with their respective parts, as and for the purposes herein fully described.

73,864.—DRAFT EQUALIZER.—James Averill, Champlain, and Elisha S. Fitch, Mooers, N. Y.

We claim, 1st, The combination of a curved segment, b', with the central part of the forward side of the equalizer, B, substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the friction roller or wheel, F, and pivoting-pin, G, with the tongue, A, and with the curved segment, b', to sustain the draught, substantially as herein shown and described.

3d, The combination of the strap, H, or its equivalent, with the pin, G, roller, F, equalizer, B, and tongue, A, substantially as herein shown and described, and for the purpose set forth.

4th, The combination of the long staple, E, with the equalizer, B, and hammer pin, C, substantially as herein shown and described, and for the purpose set forth.

5th, Attaching the equalizer, B, to the tongue, A, substantially in the manner herein shown and described, so that the said equalizer may be readily detached from the said tongue.

73,865.—COMPOSITION FOR COLORING HAIR.—James C. Ayer and Edward Haeffeley, Lowell, Mass.

We claim the combination of the tartro-plumbite of soda or potash, the oxalo-plumbite of soda or potash, either or all of them, with glycerin, spirits, and water, in the proportions above specified, or in any other proportions, for the purpose specified.

73,866.—GUIDE FOR CARDING ENGINE.—John Bachelder, Norwich, Conn.

I claim, 1st, The combination of two or more adjustable guide bars, constructed substantially as described and for the purpose set forth.

2d, The arrangement of the screws, h and i, with the bolt, g, for the purpose specified.

73,867.—AXLE GAGE.—Allen J. Beach and Alexander H. Beach, Linden, Mich.

We claim the horizontal bar, A, in combination with the sliding gage, B, the angle bar, C, provided with knuckle-joints, D D, the adjustable bars, E E, provided with other joints, F F, the gage bars, G G, working in the slots, H H, and the set screws, I I, when constructed and arranged substantially as and for the purpose described.

73,868.—ELECTRIC GAS-LIGHTING APPARATUS.—Frank Bean, Boston, Mass., assignor to himself, E. E. Bean, and Levi H. Straw.

I claim, 1st, In combination with the ratchet and its crank, the spring connecting the crank to the valve rod, substantially as shown and described.

2d, Also, the combination and arrangement of the valve, the valve chamber, and the inlet and outlet for the gas, when the valve is so arranged that it shuts off communication between the valve chamber and the valve rod tube when connection is open between the supply pipe and the burner, and shuts off communication between the supply and burner pipes when the gas is not burning.

73,689.—MEASURING RECEIVER FOR STILL.—William M. Blume, New York city.

I claim, 1st, The rod, H, provided with the cups, I I, whereby the hight of the liquid is automatically recorded, as set forth.

2d, The arrangement of the perforated plates, D G, and G1, whereby the liquor is caused to enter the measuring compartment, b, steadily, as desired.

3d, The perforated false cover, E, when arranged below the real cover of a receiver, substantially as and for the purpose herein shown and described.

4th, The arrangement and combination with each other, of the vessel, A, plates, D G, G1, covers, B and E, rod, H, and cups, I, all made and operating substantially as and for the purpose herein shown and described.

73,870.—LAMP.—Arthur W. Browne, Brooklyn, N. Y.

I claim, 1st, The inclining tube, T, in combination with the central shaft, F, wheel, W, and rotating bottom piece, arranged in the manner and for the purpose substantially as described.

2d, In combination with the inclining tube, T, the central opening through the tube, B, for the purpose of facilitating the filling of the lamp.

73,871.—BUTTON.—Francis M. Bugbee, Kingsville, Ohio.

I claim a sleeve button, the outer button, a, of which is constructed with a notched recess, and with a shank, c, to which is attached a disk, g, carrying a spring, e, said head being placed within the recess in the button, a, and the latter is connected with the lower button, b, by a stem, c, passing through the shank, and rigidly connecting the two buttons, the parts being arranged substantially as described.

73,872.—PREVENTING INCRUSTATION OF STEAM BOILERS.—Samuel G. Cabell, Quincy, Ill.

I claim, 1st, The multiplied or compound electro-magnet, L, constructed substantially as described, and arranged in combination with the chamber, C, points, G, and battery, O, essentially as described.

2d, The application of the electro-magnet, within a steam boiler or chamber connected therewith, to prevent incrustation, substantially as specified.

73,873.—FASTENING FOR CORSETS.—W. B. Cargill (assignor to himself and I. Strouse & Co.), New Haven, Conn.

I claim the within-described corset fastening, consisting of the hook and eye, formed as shown, and secured to the steels without riveting, as herein set forth.

73,874.—REDUCING LEAD ORES.—Charles F. Carpenter, Louisville, Ky.

I claim the introduction of atmospheric air and steam, together or separately, directly into the space marked B, in a reverberatory furnace, so that they may pass directly between the flame and the ores of lead upon the hearth.

Also, introducing air and steam through the fire bridge, so that they may be intensely heated before acting on said ores, as herein described, or any other method substantially the same.

73,875.—CHECK AND HARNESS REIN.—William Clark, Valatie, N. Y.

I claim the check rein, fastened at one end to the main or driving rein, and extending through a runner on the billet for the throat latch; thence downwards and through the bit ring, or a pulley connected to said ring; and thence upwards to the upper runner, where its other end is fastened, substantially as described.

73,876.—DEVICE FOR SCARIFYING THE SOIL PREPARATORY TO PLANTING.—Elisha Crane, Elkhart City, Ill.

I claim, 1st, Arranging in a suitable frame a series or gang of cutting blades or disks, when the same are so adjusted as to cut the soil in parallel channels, substantially as described and for the purpose specified.

2d, The lever, H, and curved arm, I, in combination with the windlass frame, when the same are arranged substantially as described and for the purpose specified.

73,877.—PRIMING METALLIC CARTRIDGES.—James F. Cranston, Springfield, Mass.

I claim the manner of fastening in the fulminate in a metallic cartridge shell, by means of the cover, b, attached upon the outside of the shell, substantially as described.

73,878.—HARVESTER RAKE.—Jos. Dick, Jr., Canton, Ohio assignor to himself and Eugene Glen, Rochester, N. Y.

I claim, 1st, The gear-plate or casting, made in one piece, with bearings for the crank wheel and vibrating rake shaft or support, and provided with standards, a, and adjustable stops, substantially as described.

2d, The arrangement of the crank wheel which drives the rake relative to the shaft or support of the rake, substantially as described.

3d, The arrangement of the crank wheel in the described relation to the uprights or arms in which its driving shaft is mounted, as described.

4th, The horizontal shaft, through which motion is imparted to the vibrating rake and rake gearing, mounted in uprights on the gear-plate or its equivalent, and over the crank wheel, substantially as described.

5th, The vibrating rake carrier and sector arms, combined and operating substantially as described.

6th, The vibrating rake arm, in combination with its tubular carrying arm, substantially as described,

7th, The vibrating sector arm, in combination with a tootbed segment or its equivalent on the rake arm, operating substantially as described.

8th, A latch connected to the vibrating rake arm, and operating in connection with the vibrating sector arm to hold the rake in its elevated position substantially as described.

9th, The arrangement of the lever, k, relative to the vibrating arms, and rake latch for releasing the same, as set forth.

10th, The latch lever, operated to release the latch by means of a cam or projection on the crank wheel, as set forth.

11th, The employment of a yielding or spring stop for limiting the upward throw of the rake.

12th, The arrangement of the spring stop or its equivalent upon the vibrating rake arm, substantially as described.

13th, The adjustable dove-tail lug, through which the pitman is connected with the vibrating rake carrier, substantially as described.

73,879.—DEVICE FOR SETTING SAWS.—Henry Disston, Philadelphia, Pa.

I claim, 1st, The tapering block, A, with one or more angular recesses, in combination with the tapering plate, B, the block and plate being adjusted longitudinally, and being otherwise constructed substantially in the manner and for the purpose herein set forth.

2d, The combination of the said block and plate with the adjustable rods, D D, for the purpose specified.

73,880.—SAW-GUMMING MACHINE.—Thos. S. Disston (assignor to Henry Disston), Philadelphia, Pa.

I claim, 1st, The frame, A, with its curved guides, b and b', in combination with the adjustable frame, B, and its cutter, F, sliding on the said guides and carrying a cutter, F.

2d, The adjustable guide bar, G, combined with the frame of the machine, substantially as and for the purpose specified.

3d, The jam nut or nuts, d, in combination with the screw, C, for adjusting the frame, B, substantially as described.

4th, The recesses, t t, on the guides, b', of the frame, A, constructed as described, when the said recesses are arranged in respect to the sliding frame, B, for the admission of the latter to, and its withdrawal from, the said frame, A, as set forth.

73,881.—ADDRESS CASE FOR RAILROAD CARS.—Stephen W. Downey, Piedmont, W. Va.

I claim, 1st, A tablet case for railroad cars, constructed substantially as herein shown and described.

2d, The slate, C, and the hinged top, D, having a glass, E, when the whole is constructed and arranged substantially as described.

73,882.—MORTAR AND CEMENT.—Edward A. Ellsworth, Washington, D. C., assignor to himself and Lysander Hill, Alexandria, Va.

I claim, 1st, The use of vegetable fiber in combination with plasterers' mortar and cement, substantially as and for the purpose specified.

2d, Mortar or cement, when prepared with vegetable fiber, substantially as and for the purpose specified.

3d, As an article of manufacture, vegetable fiber, when reduced to fine filaments, and cut into short lengths, as a substitute for plasterers' hair, substantially as described.

73,883.—LEAD PENCIL.—Eberhard Faber, New York city.

I claim a pencil, provided with a rounded convex head, formed by dipping said pencil in a suitable compound, substantially as herein set forth.

73,884.—COMB.—Caleb Foster (assignor to Elias Brown), Wappinger's Falls, N. Y.

I claim an enameled steel comb, the teeth of which are punched out of a single steel plate, and finished, substantially as herein described.

73,885.—SLEIGH AND SLED.—D. C. Frazeur, Sidonsburg, Pa.

I claim, 1st, The combination and arrangement of the wheels, D D, and runners, C C, substantially as and for the purposes specified.

2d, The combination of the lever, G, shaft, F, pitmen, H H, and cross-bars, E E, with the pivoted runners, C C, bearing the wheels, D D, substantially in the manner and for the purposes set forth.

73,886.—DRUM ATTACHMENT FOR STOVES.—J. C. Gaston, Cincinnati, Ohio.

I claim a stove provided with the domes, B and C, and the dampers, E, all constructed and arranged substantially as set forth.

73,887.—CONNECTING STOVE PIPES.—Nelson W. Green, Cortland Village, N. Y.

I claim, 1st, The open spring or elastic sleeve, B, when the same is constructed substantially as described, and for the purpose specified.

2d, The wire spring, C, when the same is constructed so as to be applied substantially as described, and for the purpose specified.

3d, The open spring or elastic sleeve, B, and the wire spring, C, when the same are combined so as to operate substantially as described and for the purpose specified.

73,888.—DIE FOR FORMING SLOTS IN SCREWS.—Henry Hammond, Hartford, Conn.

I claim, 1st, The combination of the devices, A e B f, when constructed and arranged to be used in conjunction, substantially as specified.

2d, The combination of the devices, A e B, constructed and operating substantially as herein set forth.

73,889.—CAR COUPLING.—David Harger, Des Moines, Iowa.

I claim the revolving coupling bar, G, when constructed and arranged as herein specified, in combination with the lever, H, keeper, I, and spring jaws, A A, as and for the purposes herein described.

73,890.—WOOD-SAW FRAME.—Jesse Havens, Auburn, N. Y.

I claim, 1st, A saw frame, in which a bifurcated wooden brace, C C', constructed in one piece, as described, is used, in combination with the end pieces, substantially as described.

2d, The piece, D, constructed with a neck and bead, D3, and used in combination with the frame pieces, A B and C, with which it is united, substantially in the manner and for the purpose set forth.

73,891.—CULTIVATOR.—Christofer Heffit, Tazewell county, Ill.

I claim, 1st, The combination and arrangement of the diagonal frame, A, and cross-bar, C, pivoted to the main frame, and having the standards, h and u, attached thereto, as shown, with the levers, c, all as shown and described.

2d, In combination with the above, the detachable handle, F, and the lever, H, arranged to operate as and for the purposes set forth.

73,892.—CRADLE.—Lysander Hill and Adelaide R. Hill, Alexandria, Va.

We claim, 1st, A cradle, so constructed and operating that it vibrates longitudinally, the body of the cradle always keeping a horizontal position substantially as and for the purpose set forth.

2d, In connection with a cradle, operating as above described, the axles, G G, arranged transversely under the body of the cradle, and having rockers, B B B, attached to their extremities, and operating in the manner and for the purposes substantially as specified,

3d, The combination of the cradle-body, A, with the rockers, B B, and wheels, C C, when the parts are so constructed and connected that the device may be adjusted to serve either as a cradle or a wagon, substantially in the manner described.

73,893.—SHUTTER FASTENING.—Gibbons G. Hickman (assignor to himself and George Windle), Coatesville, Pa.

I claim, 1st, The elastic strap or connection, C, substantially as and for the purpose explained.

2d, The combination of the elastic strap, C, stud, D, and button or latch, E, arranged and operating substantially as described,

3d, In combination with the subject of the preceding clause, the rings, F F', applied in the manner and for the purpose set forth.

73,894.—MANURE DRAG.—Uriah Hummer, White Oak, Pa.

I claim the arrangement of my drag-arm, G, with its hook, g, in combination with the two cross-pieces, J I, hook and link, J R, and connecting rod, O, with the lever, P, notched pawl, T, and spring, S, substantially in the manner and for the purpose specified.

73,895.—CHURN.—Benjamin Illingworth, Freeport, Ill., assignor to Andrew J. Brubaker and Albert Bliss, Jr.

I claim the dasher, A, as constructed, used with the staff, B, made hollow, and provided with the plug, D, and nipple, C, substantially as and for the purpose set forth.

73,896.—ALARM FOR GRIST MILL.—James D. Irvin, Corydon, and Bryson I. Seward, Bloomington, Ind.

We claim, 1st, The movable standards or frames, B, the wheels, C, provided with the adjustable arms, D, and stops, t, substantially as and for the purposes specified.

2d, The triggers, E, provided with the stops, r, the springs, p, acting upon the wheels, C, for the purposes set forth.

3d, The combination of the running-gear with the wheels, C, provided with the adjustable arms, D, and shanks, x, of hammers, h, furnished with points, i i i, the whole forming a double alarm for mills, substantially as herein described.

73,897.—BURGLAR ALARM LOCK.—Albert Isensee, Indianapolis, Ind.

I claim, 1st, The sliding tumbler, D, and arm, l, arranged to operate in combination with the bolt, B, substantially in the manner and for the purpose set forth.

2d, The set, P, in combination with the trigger, O, substantially as and for the purpose set forth.

73,898.—CENTRIFUGAL PUMP.—Edmund M. Ivens, New Orleans, La,

I claim, 1st, The arrangement of the valve, G, relatively to the pump, B, suction pipe, F, and branch pipes, d d', and their connection, e, substantially as shown and described, for the purpose set forth.

2d, The arrangement of the branch pipes, d d', and their connection, e, relatively to the valve, G, essentially as and for the purpose set forth.

73,899.—ROOFING MATERIAL.—A. Jameson, Trenton, N. J.

I claim a roofing material, consisting of a sheet of felt, in which is embedded a textile fabric or fibrous strands, substantially as described.

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73,900.—CARBURETTED AIR LAMP.—J. D. Jenkins, Charlestown, Mass.

I claim as a new article of manufacture a lamp in which the vapor for burning is produced by sending a current of air through a saturated packing, said current being impelled by a fan blower, substantially as and for the purpose set forth.

73,901.—DEVICE FOR SHARPENING HORSESHOE CALKS.—John Johnson, Barrington, N. Y.

I claim, 1st, The clamp bar, A, or its equivalent, adapted to be secured to the shoe, substantially as and for the purpose set forth.

2d, The adjustable swinging arm, provided with the rotary file, G, in combination with the clamp bar or its equivalent, substantially as described.

3d, The rotating circular file, arranged on a vertical or nearly vertical shaft and operating substantially as and for the purpose described.

4th, The removable sleeved cap or plate, J, for holding the shaft and circular file in place as described.

5th, The standard, F, and set screw, f, in combination with the dovetail slide, C, for holding said slide in place on the clamp bar, as described.

73,902.—CAR COUPLING.—John B. Johnson, Laurel, Ind.

I claim, 1st, The combination of the spring, B, pin, D, lever, E, and wheel, F, and chains, E' and C', with the pin and link of a railroad car, substantially as set forth.

2d, Suspending the coupling pin, C, from a wheel, on the opposite side of which is a lever suspended so as to more than counterbalance the weight of the pin, when said lever is so supported that by the entrance of the link into the drawhead, the pin, released from the weight of the lever, will fall by its own gravity, substantially as set forth.

73,903.—CLIP AND FERRULE FOR JOINTS ON FELLIES.—Phineas Jones, Newark, N. J.

I claim the combined clip, a, and ferrule, b, with the rib, c, made substantially as specified and shown.

73,904.—HORSE RAKE.—A. S. Kendall, Guilford, Me.

I claim, 1st, The rake teeth in combination with the secondary teeth, Q, and spring, R, substantially as described and for the purpose set forth.

2d, The rake teeth, P, and secondary teeth, Q, in combination with the hay gatherer, M N O, operating as set forth for hauling the hay into the receptacle, substantially as described.

73,905.—SPRING FOR BED BOTTOMS, CHAIRS, ETC.—A. H. Knapp, Newton Centre, Mass.

I claim the wire springs, b b, constructed by bending the same into a succession of loops, as shown in the accompanying drawings, to be used in constructing the bottoms of beds, chairs, settees, sofas, and lounges.

73,906.—BATH TUB.—Ernest J. Knowlton, Ann Arbor, Mich.

I claim the portable frame, A, constructed of a series of hinged sections, as specified, and provided with a flexible bath apparatus, in the manner and operating substantially as set forth.

73,907.—URINAL.—Samuel Males, Cincinnati, Ohio.

I claim a urinal, or necessary, having two or more doors, F F', so constructed as to stay each other in the partially open position, and to close automatically when liberated, substantially as and for the purposes set forth.

73,908.—SPIKE.—Wm. W. Martin, Allegheny City, Pa.

I claim a new article of manufacture, viz., a spike constructed and operating substantially as herein described, and for the purpose set forth.

73,909.—MACHINE FOR OILING WOOL.—Miles Mayall, Roxbury, Mass.

I claim, 1st, The combination of the elevated reservoir, connecting tube, and hollow perforated shaft, substantially as and for the purpose set forth.

2d, The combination of the elevated reservoir, the connecting tube, hollow perforated shaft and revolving perforated cylinder, from which the oil is applied to the wood, substantially as described.

3d, In combination with the tube for applying the oil from the reservoir, an oscillating perforated hollow shaft, i, from which the oil will be made to flow, on starting the carding machine, and be cut off on stopping the same, by means of connecting mechanism acting upon the arm or wheels, g, substantially as described.

4th, Regulating and indicating the supply of oil to the cylinder, m, by means of the valves, o o and h h, indicator, q q, and dial plate, r r, substantially as set forth.

5th, In combination with a perforated cylinder, m, the brushes, y and z, for cleansing the apertures, arranged substantially as set forth.

5th, The combination of the endless apron and cylinder, m, when the frame supporting the latter is constructed with the pipes, d d, resting upon standards, b, to permit the cylinder to rise and fall, substantially as set forth.

7th, The combination and arrangement of the perforated cylinder and perforated shaft, i, as and for the purpose set forth.

73,910.—SPINNING MACHINE.—John McCune, Auburn, Ind.

I claim, 1st, The double horizontal spindles, Q, constructed substantially in the manner set forth.

2d, The treadle, the yarn guides, the tension regulator, the spindles, and the carriers, constructed and arranged substantially as set forth.

3d, The combination of the pulleys, C and D, connected by a crossed belt, and the pawl, T, for regulating the tension of the belt when the shaft of the elevating pulley is attached to the frame by adjustable bearings, substantially as set forth.

73,911.—APPARATUS FOR COUNTING MONEY.—J. W. Meaker, Chicago, Ill.

I claim, 1st, A series of tubes of varying diameters, to suit different sized coins, and provided with graduations corresponding with the varying thickness of different coins, and numbers to indicate the amount contained in each tube.

3d, A coin assorter, consisting of an inclined way for the coin to pass down, with openings corresponding in size with the various sized coins, said openings being arranged with the smallest at the upper end of the inclined way, and increasing in size in regular order towards the lower end, with partitions or guides to direct the various coins to their respective receptacles, substantially as described.

3d, The yielding bed, m, pivoted at one end, in combination with the stationary support, a, arranged as and for the purposes set forth.

73,912.—LAMP.—Rufus Spaulding Merrill and William Carleton, Boston, Mass.

We claim in a lamp burner in which the cone and chimney holder are connected with a sleeve fitting the wick tube the arrangement of the parts substantially in the manner herein described so that the removable parts of the burner when taken from the wick tube may be deposited in an upright position and supported upon a broad base, as and for the purposes set forth.

73,913.—VAPOR INHALER.—Mason M. Miles, Aurora, Ill.

I claim the combination of the tubes, C D, with the vessel, A, and bulb, B, the various parts constructed substantially as and for the purposes specified.

73,914.—HARVESTER.—C. Moul, Hanover, Pa.

I claim a shaft for connecting the driving power of a harvester with a rake or reel or other device applied upon a hinged finger beam or platform and to be driven when such shaft is constructed of three or more than two longitudinally-adjustable telescopic sections and such sections fitted together by tongues and grooves and shoulders and stops, all substantially as and for the purpose described.

73,915.—BEEHIVE.—Jacob Neal, Orleans, Iowa.

I claim, 1st, Providing the moth slides, G G, with metal scrapers, t t, when used in the boxes, B B, in the manner and for the purposes specified.

2d, The boxes, B B, communicating as described, moth slides, G G, having scrapers, t t, blocks, H H, with their small cavities, perforated slides, F F, and buttons, E, the whole being constructed, arranged and used in the manner and for the purposes set forth.

73,916.—MANUFACTURE OF ARTICLES OF RUBBER, GUTTA-PERCHA, ETC.—J. B. Newbrough and Edward Fagan, New York city.

I claim the manufacture of articles of utility or ornament by subjecting rubber, gutta-percha, or similar gum either before or after it is formed of the desired shape, to the action of bromine, substantially as described.

73,917.—MATERIAL PRODUCED BY HEATING CAOUTCHOUC AND OTHER GUMS.—J. B. Newbrough and Edward Fagan, New York city.

We claim the within-described new manufacture or substance consisting of caoutchouc, or equivalent gum, incorporated with iodine and sulphur (after treating the said iodine and sulphur substantially as specified), and subjected to heat.

73,918.—DUMPING CART.—G. E. Newell, Pawtucket, R. I.

I claim, 1st, The combination and arrangement of the hinged rack, C, the train of gear wheels, k l m n o, and the pressure roller, f, with the body of a dumping cart, substantially as described for the purposes specified.

2d, Combining with the hinged rack, C, a pressure roller for the purpose of keeping the teeth of the rack in engagement with the teeth of its operating pinion at all positions of the cart body, substantially as described.

73,919.—COMPOSITION FOR THE SOLES OF BOOTS AND SHOES.—Jeremiah L. Newton, Boston, Mass.

I claim a mixture composed of caoutchouc or rubber, gutta-percha, or an equivalent gum, mixed with pulverized quartz, sand, felt, or their equivalents, and applied to or for the soles of boots and shoes for the purpose of preventing slipping, substantially in the manner and for the purpose above set forth.

73,920.—HAIR CLOTH.—John Noblit, Philadelphia, Pa.

I claim, 1st, Two or more nippers or hair carriers in a loom for weaving hair cloth which are operated so as to close upon two or more hairs simultaneously and then to drop the hairs singly and at different points in the shed or warp, substantially as described.

2d, A fabric, each lay of the woof of which is composed of two or more hairs laid together, substantially as described.

73,921.—APPARATUS FOR CLEANING CLAY.—Luman P. Norton, Bennington, Vt.

I claim, 1st, The screw shaft, E, in combination with the stopping and reversing cams, N, and the pins, P, on the lever, M L, substantially as and for the purpose set forth.

2d, The sieve, W, the pressing plate, D, in combination with the stopping and reversing cams, N, and their adjuncts, arranged and operated substantially as and for the purpose set forth.

73,922.—COMPOSITION FOR KINDLING FIRES.—Warren C. Philbrick, Lynn, Mass.

I claim the use of the several ingredients hereinbefore mentioned in combination for the purpose of kindling hard-coal fires, substantially as above set forth.

Also in a particular manner the pressing of the material while hot into blocks or cakes as stated having the bevelled edges, C C, and especially the openings or draft holes, a a a, for producing strong and ready combustion.

73,923.—TOOL FOR OPENING BARRELS.—Thomas J. Phillips, Washington, D. C.

I claim, as a new implement for removing hoops from barrels, etc., the herein-described head, A, provided with the hammer, C, or its equivalent, a suitable handle, and the hook, D, all constructed and operating substantially as described.

73,924.—INDIA-RUBBER SOLE.—R. S. Pickett, New Haven, Conn.

I claim the rubber sole described the edge of which is formed of a harder compound than the body of the sole and the whole formed and finished by the process of vulcanization and so as to be attached to the boot or shoe, in the manner set forth.

73,925.—WINDOW SCREEN.—C. C. Plaisted, Hartford, Conn.

I claim, 1st, The combination of the screen and pins, b, in the manner and for the purpose herein set forth.

2d, The combination of the screen and clamp or clamp bar, E, in the manner and for the purpose herein set forth.

73,926.—SPOOL STAND.—G. A. Pridham, Newark, N. J.

I claim the box, A, in combination with the bar, B, with its arms, C C C', and used as and for the purpose set forth.

73,927.—METALLIC BAND FOR TRIMMING CAR SEATS.—D. F. Randall, Chicopee, Mass.

I claim a metallic band, having the projections, a a', formed thereon, substantially as and for the purpose set forth.

73,928.—MACHINE FOR THREADING SHEET-METAL PIPE.—Carl Recht, New York city.

I claim, 1st, The combination of the cam roller, f, or its equivalent, with the movable or sliding strip, h, or its equivalent, when arranged as specified and used for the purpose set forth.

2d, The combination of the gage plate, H, with the cylinders, A and B, substantially as set forth.

3d, The combination of the clutch, O, and set screw with rest, I, all constructed as described, when used for the purpose set forth.

73,929.—SHEET-METAL PIPES.—Carl Recht, New York city.

I claim, 1st, Cutting sheet metal into rhomboids, a l d m, for the purpose of making an overlap, z, equal to the pitch of a thread which, after rolling said rhomboidal sheets into pipes, I turn on the ends of said pipe, substantially as herein specified.

2d, Also, making sheet metal piping, the ends of which are parallel to the thread which is turned thereon, substantially as herein specified.

73,930.—BRAID-MAKING MACHINE.—Geo. Rehfuss, Phila., Pa., assignor to the American Buttonhole, Overseaming, and Sewing Machine Company, Pennsylvania.

I claim, 1st, The combination of the plate, B, lever, G, rod, D, and its needle, d, the whole being constructed, arranged, and operated substantially as and for the purpose described.

2d, The combination of the above and the spring plate, o, for the purpose set forth.

73,931.—PUDDLING FURNACE.—Henderson Ross, Pittsburgh, Pa.

I claim, 1st, A water clamp for furnaces, constructed, arranged, and operating substantially as herein described and for the purpose set forth.

2d, Surrounding the neck or throat with water, substantially as herein described and for the purpose set forth.

73,932.—CHURN.—Jesse B. Rumsey, Port Huron, Mich.

I claim, 1st, The vessel or hopper, C, provided with a long slot in its bottom and with a slide or cover, D, to close this slot for regulating and controlling the supply of milk to the churn below, substantially as set forth.

2d, The shaft, E, provided with wings, and situated beneath the vessel or hopper, C, as and for the purpose specified.

3d, The wings or paddles, G G, made in a curved form, and arranged upon the shaft, F, near the bottom of the churn, with holes made diagonally through them, and with journals on each end, so that they will fold up on the shaft, substantially as set forth.

4th, The collars, P, for the ends of the shaft, F, said collars being provided with arms in which are holes to receive the journals of the wings, G G, as and for the purpose set forth.

73,933.—HILLSIDE PLOW.—Hiram Sloop, Mount Healthy, assignor to himself and Jeptha Garrard, Cincinnati, Ohio.

I claim a reversible hillside plow, characterized by two plows proper, secured back to back, and provided with a beam capable of being swung and locked in diametrically opposite directions, dogs, I J, abutment bar, H, sheaths, E E', lever, M, and rack, N, or their equivalents.

73,934.—LANTERN.—A. G. Smith, Jersey City, N. J.

I claim, 1st, An inwardly-projecting flange around the base or top of a lantern glass, substantially as and for the purpose set forth.

2d, A shoulder or depression in the side of the lantern glass, in combination with a spring or automatic catch, to lock and retain the globe within the guard frame, substantially as set forth.

3d, Holding a movable lamp or oil pot down in its proper place upon the base plate, f, by means of the burner shaft.

4th, Securing the bottom, B, and the guard frame, A, to each other, by passing the burner shaft, F, through both of the bands, a and h, and at opposite sides of the lantern, substantially as set forth.

5th, In combination with the burner shaft, F, extending through both sides of the bands, a and h, and securing the bottom, B, and guard frame, A, together, a spring catch, H, substantially as and for the purpose set forth.

6th, In combination with the burner shaft, F, and slot, g, or its equivalent, the notch, r, substantially as and for the purpose set forth.

7th, Holding a burner down in its proper place by means of the burner shaft, secured to both sides of the band, h, substantially as set forth.

8th, Projecting the lower end of the lantern glass, C, downward within the band, h, substantially as and for the purpose set forth.

9th, The combination of the burner shaft, F, secured at each end to the band, h, with the top of the lamp pot, G, in such a manner that the said burner shaft shall, when in position, be slightly bent or sprung so as to produce a pressure upon the burner, E, and lamp, G, sufficient to retain them respectively in their places, substantially as herein specified.

10th, Fastening a movable lamp pot, which rests on the bottom of the lantern without any part extending through the same, down in its place, by means of a fastening bearing upon its top, as set forth.

11th, A seat, p, formed in the base plate, f, to retain the movable lamp pot in a central position, substantially as set forth.

73,935.—CAR COUPLING.—Jas. W. Smith and John P. Smith, Elder's Ridge, Pa.

I claim the sprng, c, in combination with the lever and foot rod, a, upright, a3, and chain, a1, and coupling pin, b, when the same are so arranged as to operate substantially as described, and for the purpose set forth.

73,936.—APPARATUS FOR MAKING ICE AND FOR COOLING AIR AND LIQUIDS.—Daniel E. Somes, Washington, D. C.

1 claim, 1st, the bed frame, as and for the purpose set forth.

2d, Atomizing liquids, substantially as shown in fig. 2.

3d, Connecting cars or boats, and other vessels, as and for the purpose set forth.

4th, Cooling cars, for the transportation of meats and other food, substantially as set forth.

5th, Cooling and ventilating passenger cars, substantially as set forth.

6th, Cooling ships, boats, and other vessels, as described.

7th, Cooling corn, wheat, and other kinds of grain, in canal boats and other vesels, substantially as set forth.

8th, Cooling grain in granaries and other buildings, substantially as set forth.

9th, Using ice and other cooling or freezing substances, in combination with a machine or machinery for producing cold, and as an alternative or reinforcement of cold, when such machine or machinery shall from any cause cease to operate, for the purposes herein set forth.

10th, Making ice and freezing cream as herein described.

11th, Cooling liquids and condensing steam, gases, or vapor, substantially as set forth.

12th, Purifying air and cooling it, substantially as and for the purposes set forth.

13th, Cooling or freezing meats, fish, fruits, and other kinds of food, substantially as described.

14th, Cooling or freezing meats, vegetables, or other food, by means of machinery, in combination with chemical agents.

15th, Cooling cars by means of a machine or machinery.

16th, A car having in it or connected with it a machine or machinery for cooling or freezing, as an article of manufacture.

17th, The apparatus herein described, or its equivalent, as an article of manufacture.

18th, Canal boats and other vessels, with lining and tubes, substantially as described, in combination with the apparatus herein described.

19th, Flexible air tubes for connecting cars or boats and other vessels.

20th, Canal boats with tubes for conducting cooled air, and means for ventilating, and the apparatus, or an equivalent, for cooling or freezing, substantially as described.

73,937.—WATCH.—O. F. Stedman, Ravenna, Ohio.

I claim the band or ring, C, beveled or made thin near its upper edge, with its lower edge resting upon the case frame, B, said ring being made narrower than the movement, and just wide enough to cover the space between the plates, a and b, substantially as and for the purpose set forth.

73,938.—APPARATUS FOR CLEANING PRIVIES.—Louis Straus, Louisville, Ky.

I claim, 1st, The combination of the reservoir or receiving tank, A, and deodorizer, B, with a forcing engine, substantially as and for the purposes described.

2d, The sliding valves, l, of the engine, constructed with cutting edges, substantially in the manner and for the purposes described.

3d, An apparatus for emptying privy vaults, constructed and operating substantially as described.

73,939.—MEDICAL COMPOUND.—John M. Thompson, Saltillo-ville, Ind.

I claim the within described mixture, compounded as and for the purpose set forth.

73,940.—CAR REPLACER.—Alban N. Towne, Chicago, Ill.

I claim an apparatus for replacing cars upon the track formed by a combination of the clamp, E, and bars, D, the former to be attached adjustably to the rail by keys, J, and the latter made of unequal lengths, and terminating with dog, H, for attaching adjustably to the track, substantially as set forth.

73,941.—RUNNING GEAR FOR CARRIAGES.—J. B. Withey, Lexington, Ky.

I claim the combination and arrangement of a running gear for carriages, as hereinbefore described, when constructed with the wrought spindle or journal shaft, A, the hub, B, a collar and nut, C, boxes, D, bars, E F G H I and K, reach, J, plate, L, dog, M, and draft rods, N, when put together and operating substantially as and for the purposes set forth.

DESIGNS.

2,860—COFFIN.—Wm. G. Algeo, Pittsburgh, Pa.

2,861.—SCARF PIN.—Chas. A. Flesche and John Perpente New Haven, Conn.

2,862.—OIL CAN.—Chas. J. Hauk, Brooklyn, N. Y.

2,863.—FRAME.—Wm. J. Lusk, Fentonville, Mich.

2,864 and 2,865.—CARPET PATTERN.—Levi G. Malkin, New York city, assignor to Hartford Carpet Company, Hartford, Conn. Two patents.

2,866.—MASONIC HALL.—John McArthur, Jr., Philadelphia, Pa.

2,867 and 2,868.—TRADE MARK.—Theo. G. Meier, St. Louis, Mo., assignor to St. Louis Cotton Factory. Two patents.

2,869.—TRADE MARK.—Chas. J. Miller, Philadelphia, Pa.

2,870.—TRADE MARK LABEL.—James M. Taft, North Providence, R. I.

2,871.—CARPET PATTERN.—Henry G. Thompson, New York city, assignor to Hartford Carpet Company, Hartford, Conn. Thirty-two other patents having the same title as the above also granted, the numbers extending from 2,871, ending 2,903.

2,904.—GOOD TEMPLAR BADGE.—W. H. Wilson, Providence, R. I.

PENDING APPLICATIONS FOR REISSUES.

Application has been made to the Commissioner of Patents for the Reissue of the following Patents, with new claims as subjoined. Parties who desire to oppose the grant of any of these reissues should immediately address MUNN & Co., *37 Park Row, N. Y.*

67,355.—MACHINE FOR GRINDING REAPER KNIVES.—Henry Richardson, New York city, assignee by mesne assignments of Edwin M. Scott, Auburn, N. Y. Dated July 30, 1867. Application for reissue received and filed Jan. 14, 1868.

1st, I claim as the invention of Edwin M. Scott, in combination with an oblique revolving grinding wheel or stone on the end of a shaft the vertically or nearly so swinging frame for holding the reaper knife to be ground so that it may be swung up to the stone or back to be examined by the operator, substantially as described.

2d, In combination with the swing frame the inclining of the clamping bar or of the knife so that the sections or edges to be ground may be brought in their entire length to the grinding surface of the stone, substantially as described.

3d, In combination with the clamping bar and the knife the hook-headed clamp, o, for holding the knife to the bar and so that the stone or the bar and knife may be moved without interfering with the grinding operation, substantially as described.

4th, The combination of the disk, slides, and thumb screw, as and for the purpose set forth.

5th, The combination of the disk, slides, bolt and lever, substantially as and for the purpose described and represented.

56,102.—CULTIVATOR.—John S. Rowell and Ira Rowell, Beaver Dam, Wis. Dated July 3, 1866. Application for reissue received and filed Jan. 18, 1868.

We claim the combination of the slotted beam, A, shank, A, brace bar, C, and bolt, D, when the parts are constructed and arranged to operate as and for the purposes herein specified.

70,782.—BEEHIVE.—James M. Beebe, Casadaga, N. Y. Dated Nov. 12, 1867. Application for reissue received and filed Jan. 20, 1868.

I claim, 1st, Constructing beehives of comb frames so formed that when combined together they will form a tight hive, substantially as and for the purpose set forth.

2d, Securing the said comb frames together by means of a wire bail, b, and wedge, e, in the manner shown and described.

3d, The construction of the ventilating board, H, in the manner and for the purpose specified.

4th, The combination and arrangement of the outer case, A A', ventilating board, H, inner hive and packing material, J, substantially as and for the purpose set forth.

5th, Bridging the space between the ends of the hive and outer case so as to form a continuous passage, f, for the bees and to prevent the same being closed by the packing in winter, substantially in the manner set forth.

6th, The employment and combination of the partition board, E, with the comb frames, C C, for reducing or dividing the hive, for the purpose and in the manner specified.

7th, The mode of forming the passages, g g, in a hive composed of comb frames, C C, to the surplus honey boxes above, as herein shown and described.

38,373.—BOOTS AND SHOES.—Boston Shoe. Stud and Button Company, Boston, Mass., assignees by mesne assignments of David N. B. Coffin, Jr., Newton, Mass. Dated May 5, 1863. Application for reissue received and filed Jan. 22, 1868.

We claim, 1st, The button-laced boot as a new article of manufacture, the distinguishing feature of which consists of the arrangement and combination of a series of buttons on one part with a lacing and a series of holes, eyelets, loops, studs or buttons upon the other of the parts to be drawn toward and fastened to each other in such manner that the loops formed by the alternating of a lacing, string or cord from the individuals of one series to those of the other may readily be unlooped from the buttons and relooped or buttoned irrespective of the fastening or unfastening of the lacing at the ends of the series so unfastening and refastening the boot or shoe and so that the unlooping of one loop relieves the tension of the next, substantially as described.

2d, In a button for lacing boots and shoes having a head and neck and a base for attachment we claim placing an excess of base or an extension from the neck upon the side opposite to the direction of the tension of the lacing or loops thereby to counteract the tendency of the button to tip or incline.

☞ NOTE.—*The above claims for Reissue are now pending before the Patent Office and will not be officially passed upon until the expiration of* 30 *days from the date of filing the application. All persons who desire to oppose the grant of any of these claims should make immediate application.* MUNN & CO., *Solicitors of Patents, 37 Park Row, N. Y.*

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The railway company running the Boston and Erie line, to save bridging the Quinnebaug river and a curve in the road, are excavating a new channel for the stream, two hundred feet wide, and nearly a quarter of a mile long. The railroad will run over the old river bed.

Another establishment for the manufacture of artificial stone has just been started in St. Louis. The new concern is engaged in making from common white sand, with soda, flint, chlorine and calcium as compounding materials artificial marble mantels of any pattern required.

A company has been organized in Bridgeport, Conn., for forming wagon bodies of hardened india-rubber composition.

The locomotives on the New York Central railroad are to be shorn of all their brass ornamental trappings, and be painted a dull brown color. This is done to save unnecessary work in cleaning, and will, no doubt, be appreciated by the engineers.

The Californians have discovered another convincing proof of the wonderfully copious natural resources of the Pacific coast, where, they proudly assert, everything requisite for human existence abounds in inexhaustless quantity. The last discovery is a mine which yields a mixed ore of lead and antimony, in the proportion of thirty parts of the former and seventy parts of the latter. This composite, until lately, was discarded as valueless, but now some genius has discovered that it only requires the proper admixture of the other minor ingredients to form a superior type metal. In San Francisco the imported antimony is worth sixteen, and lead nine cents per pound, but the metal from the new mine costs but eight cents the pound.

The yearly production of pig iron by the furnaces of Great Britain, forty years ago, was a little under 700,000 tuns, and that of the United States the same year about one-fifth that amount, or 140,000 tuns. Last year the production may be taken in round numbers, for the former country, 5,000,000 tuns, and the latter, 1,250,000 tuns, showing an increase, the effect of which upon the world cannot be estimated by figures.

The Government Commissioners for the Union Pacific Railroad have reported to the Secretary of the Interior that they find the sixteenth section of thirty miles of said road, terminating 540 miles west from Omaha, well constructed and ready for immediate service, and recommend the acceptance of the section. The present terminus of the road is 7,535 feet above tide water.

A correspondent informs us that he has found gold in Swansbury, a place about three miles below Havre de Grace, Md. Speculators will take notice.

The Lebanon Springs and Bennington railroad, connecting with the Harlem road at Chatham Four Corners, is expected to be completed by July next. Among the advantages anticipated from this new link is the formation of a trunk line from New York to Montreal without change of cars.

A bill for facilitating the building of a short branch line from Albany to Stephentown, Rensselaer county, has been introduced by Senator Banks. This latter road will be eighteen miles long, and by its construction Albany will have a direct road to the Hoosac tunnel.

NEW PUBLICATIONS.

THE BROADWAY—London and New York: Geo. Routledge & Sons, 416 Broome street. Published monthly. The February number is out. Price, $3 00 a year.

MERCHANT AND BANKERS' ALMANAC—1868.

This is a handsome bound volume of 240 pages, devoted to statistical matters of interest and importance to bankers and merchants. It contains a list of 1,650 National banks, the names of bankers and brokers in the United States and principal foreign cities; also, monthly prices of cotton, wool, wheat, and other products, for the last forty years, and other statistical information useful to business men. Published at the office, "Bankers' Magazine," 46 Pine street. Price, $2.

NORTHERN MONTHLY. No. 4.—February.

Probably no magazine has ever sprung so early into extensive notoriety as the above. Its criticism on Dickens, in one of its first numbers, made the magazine popular at once. M. R. Dennis & Co., Newark, N. J., and 37 Park row, N. Y. $3 a year.

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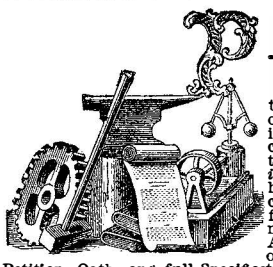

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The model should be neatly made of any suitable materials, strongly fastened, without glue, and neatly painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show, with clearness, the nature and operation of the improvement.

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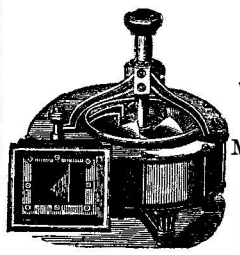

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